371.2007 S913E c.1
Strayer, George Drayton, 18
Educational administration
R.W.B. JACKSON LIBRARY
OISE CIR
3 0005 02013 4949

THE LIBRARY

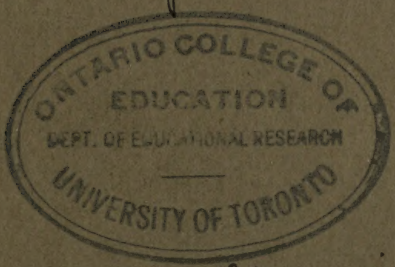
The Ontario Institute

for Studies in Education

Toronto, Canada

W. E. Macpherson

Presented to the Library
of the



Department of Educational
Research.
February 1937.

LIBRARY

JUL 15 1969

THE ONTARIO INSTITUTE
FOR STUDIES IN EDUCATION

Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

http://www.archive.org/details/educationaladmin00strauoft

EDUCATIONAL ADMINISTRATION

THE MACMILLAN COMPANY
NEW YORK · BOSTON · CHICAGO
DALLAS · SAN FRANCISCO

MACMILLAN & CO., LIMITED
LONDON · BOMBAY · CALCUTTA
MELBOURNE

THE MACMILLAN CO. OF CANADA, LTD.
TORONTO

EDUCATIONAL ADMINISTRATION

QUANTITATIVE STUDIES

BY

GEORGE DRAYTON STRAYER

AND

EDWARD L. THORNDIKE

TEACHERS COLLEGE, COLUMBIA UNIVERSITY

New York
THE MACMILLAN COMPANY
1913

All rights reserved

Copyright, 1913,
By THE MACMILLAN COMPANY
Set up and electrotyped. Published March, 1913.

379
S 913

PRESS OF T. MOREY & SON,
GREENFIELD, MASS., U. S. A.

1096

PREFACE

It is the purpose of this book to enable students of education to learn some of the methods and results of recent scientific studies of school administration. Teachers of education in universities feel the need of supplementing students' acquaintance with the common-sense principles of school management by some study of impartial and exact investigations which carry knowledge beyond conventional opinions, no matter how sagacious.

At present they must, to do this, rely solely upon lectures or require students to read long, technical and highly specialized reports of original investigations, access to which is often difficult, especially in the case of large classes.

The selections quoted or summarized in this volume are deliberately chosen from the work that has been done at Teachers College, Columbia University, in the application of quantitative methods to administrative problems. This seemed best for two reasons. The contents of the volume have thus a natural unity of purpose, method and subject matter. The likelihood is thereby increased that similar volumes will be prepared adapting for students' use the work done by other natural groups of investigators.

CONTENTS

PART I

STUDIES OF THE STUDENTS

SECTION		PAGE
1.	Enrollment in Relation to Age and Grade	3
2.	The Elimination of Pupils from School	9
3.	Promotion, Retardation, and Elimination	26
4.	The Incidence of Retardation	37
5.	The Causes of Retardation and Acceleration	41
6.	The Causes of Elimination	46
7.	The Variation Amongst Pupils of the Same School Grade	54
8.	The Social and Ecomonic Status of Pupils	69

PART II

STUDIES OF THE TEACHING STAFF

9.	The Causes and Conditions of Efficiency in Teaching	77
10.	The Social and Economic Status of Teachers	100
11.	The Supervision of Special Subjects	107
12.	The Teaching Staff of Secondary Schools in the United States	113
13.	The Influence of the Sex Balance of the Teaching Staff upon High School Enrollment	132

PART III

STUDIES OF THE ORGANIZATION OF SCHOOLS AND COURSES OF STUDY

14.	The Elementary School Curriculum	140
15.	Size of School as a Conditioning Factor in Secondary Education	165
16.	The Inefficiency of College Entrance Examinations	176
17.	The Studies Actually Taken for the A. B. Degree	188

PART IV

MEANS OF MEASURING EDUCATIONAL PRODUCTS

SECTION		PAGE
18.	Means of Measuring Educational Products	207
19.	School Achievement in Arithmetic	233
20.	School Achievement in Terms of Methods of Work	241
21.	School Records and Reports	250

PART V

SCHOOL FINANCE

22.	City School Expenditures	267
23.	Expenditures for Schools in Relation to Other Municipal Expenditures	352
24.	The Apportionment of School Funds	368

STATISTICAL TABLES

TABLE		PAGE
1.	Age-grade table for Connecticut	4
2.	Table 1 rearranged	6
3.	Age distribution in three cities	16
4.	Age distribution for twenty-five cities	17
5.	Frequency of failures of promotion	29
6.	Failures of promotion by grades	37
7.	Failures of promotion by grades	38
8.	Failures of promotion by grades	38
9.	Failures of promotion by grades	39
10.	Accelerated and retarded pupils compared	41
11.	Accelerated and retarded pupils: hereditary relationships	44
12.	Individual differences in reasoning ability	65
13.	Monthly rentals of families of high school pupils	73
14.	Table of regrouping for comparison of grades	80
15.	Teaching efficiency in relation to experience	81
16.	Teaching efficiency in relation to experience	81
17.	Teaching efficiency in relation to experience	82
18.	Salaries of teachers of equal education according to amount of experience	88
19.	Salaries of teachers of equal education according to amount of experience	90
20.	Salaries of teachers of equal education according to amount of experience	91

TABLE		PAGE
21.	The relation of salary to experience: men	95
22.	The relation of salary to experience: women	96
23.	Race and nativity of American women teachers	101
24.	Parental occupation of men teachers	101
25.	Parental occupation of women teachers	101
26.	Summary of tables 24 and 25	102
27.	Relation of occupation of parents of teachers to parental income	102
28.	Relation of number of brothers and sisters to the occupation of parents of teachers	102
29.	Relation of parental income to the years of training of men teachers	103
30.	Relation of parental income to the years of training of women teachers	103
31.	Relation of parental income to beginning age for men teachers	104
32.	Relation of parental income to beginning age for women teachers	104
33.	Percentages of cities employing supervisors of special subjects	108
34.	Distribution by sex of supervisors of special subjects (1908)	109
35.	Differences in the division of responsibility	110
36.	Median annual salaries of supervisors of special subjects (1908)	111
37.	Experience in teaching: secondary school teachers	127
38.	Salaries of public and private school teachers compared	131
39.	The sex balance in high schools	133
40.	The sex balance in high schools	134
41.	The sex balance in high schools	139
42.	Changes in the sex balance in high schools	142
43.	Changes in the sex balance in high schools	143
44.	Changes in the sex balance in high schools	143
45.	Time allotment in elementary schools: American schools	152
46.	Time allotment in elementary schools: American schools	152
47.	Time allotment for New York City: 1868, 1888, 1904	154
48.	Time allotment for St. Louis: 1868, 1888, 1904	155
49.	Time allotment: English cities	156
50.	Time allotment: English cities	157
51.	Time allotment: German cities	158
52.	Time allotment: German cities	159
53.	Time allotment: American cities (1911)	160
54.	Time allotment for arithmetic and algebra	161
55.	Time allotment for arithmetic and algebra (1890 and 1911)	161
56.	The order in the course of specified topics in arithmetic	162
57.	Time allotment for geography (1911)	162
58.	Time allotment for manual training (1911)	163
59.	Frequency of different sizes of teaching staff in American high schools	168
60.	Frequency of different sizes of student body in American high schools	169
61.	Relation of size of high school to public support by States	172

TABLE PAGE
62. Relation of standing in entrance examination to standing in college (Senior year) ... 186
63. Relation of standing in entrance examination to standing in college (Junior year) ... 186
64. Relation of standing in entrance examination to standing in college (Sophomore year) ... 187
65. Relation of standing in entrance examination to standing in college (Freshman year) ... 187
66. Studies actually taken for the A. B. degree (Bowdoin) ... 190
67. Studies actually taken for the A. B. degree (Columbia) ... 191
68. Studies actually taken for the A. B. degree (Cornell) ... 192
69. Studies actually taken for the A. B. degree (Harvard) ... 193
70. Studies actually taken for the A. B. degree (Princeton) ... 194
71. Studies actually taken for the A. B. degree (Stanford) ... 195
72. Studies actually taken for the A. B. degree (Wellesley) ... 196
73. Studies actually taken for the A. B. degree (Wesleyan) ... 197
74. Studies actually taken for the A. B. degree (Williams) ... 198
75. Studies actually taken for the A. B. degree (Yale) ... 199
76. The frequency of specialization ... 201
77. The frequency of scattering ... 202
78. Preliminary tests in arithmetic ... 234
79. Scores of twenty-six systems in arithmetical problems ... 236
80. Scores of twenty-six systems in arithmetical computations ... 236
81. The relation of achievement in arithmetic to time allotment ... 237
82. The relation of achievement in arithmetic to time allotment ... 238
83. The relation of achievement in arithmetic to time allotment ... 238
84. The distribution of teachers' salaries ... 259
85. Sample age-grade table ... 260
86. Sample attendance table ... 261
87. Analyzed budgets in percentages ... 278
88. Itemized cost per pupil ... 279
89. Itemized cost per pupil ... 283
90. Itemized cost per pupil ... 287
91. Itemized cost per pupil ... 288
92. Variability in cost of education ... 293
93. Variations among cities in the several items of the budget ... 296
94. Variation among cities in the several items of the budget ... 297
95. Variation among cities in the several items of the budget ... 297
96. Variation among cities in the several items of the budget ... 300
97. Variation among cities in the several items of the budget ... 301
98. Variation among cities in the several items of the budget ... 303
99. Measures of variability ... 313

TABLE		PAGE
100.	The relation between amount spent for salaries of janitors and for teaching and supervision	314
101.	City expenditures in terms of deviations from the central tendency	321
102.	City expenditures in terms of deviations from the central tendency	322
103.	General tendencies in school budgets	325
104.	Fiscal relations	328
105.	Variations in total cost related to the amount of separate items in the school budget	330
106.	Fiscal relations	334
107.	Fiscal relations	334
108.	The stability of the various items of the budget	337
109.	Fiscal relations	339
110.	The salaries of teachers and the cost of living	341
111.	The salaries of teachers and the cost of living	342
112.	Fiscal relations	342
113.	Expense in relation to enrollment	346
114.	Analyzed city budgets	354
115.	Analyzed city budgets	358
116.	Variability in city budgets	358
117.	Variability in city budgets	359
118.	Variability in city budgets	360
119.	Variability in city budgets	360
120.	Relations of various items of city budgets	361
121.	Relations of various items of city budgets	361
122.	Relations of various items of city budgets	361
123.	Relations of various items of city budgets	362
124.	Relations of various items of city budgets	363
125.	Variability in city revenues	365
126.	Distribution of ratios of school expenses to population	366
127.	Distribution of total city expenses	367
128.	Distribution of expenses for police	367
129.	Wealth of Massachusetts counties per census child five to fifteen	373
130.	Tax rate and amount of money produced per pupil	374
131.	Valuation per census child and per school for Fairfield County, Connecticut	375
132.	Inequalities existing in the State of Missouri	376
133.	Inequalities existing in the State of California	377
134.	The tax rate necessary to produce $250 by local taxation	377
135.	A comparison of wealth, tax rate and cost of schools by counties	378
136.	The relation of the number of teachers and of children to the whole population	379
137.	The state apportionment in relation to enrollment	379

TABLE PAGE
138. The value of census apportionment on the basis of enrollment. 380
139. Various plans of apportionment. 380
140. Various plans of apportionment. 381
141. Various plans of apportionment. 381
142. Various plans of apportionment. 382
143. Apportionment on census and on teachers compared. 383
144. Apportionment on census and on teachers compared. 383

PART I

STUDIES OF THE STUDENTS

EDUCATIONAL ADMINISTRATION

§ 1. Enrollment in Relation to Age and Grade

Two of the very easiest facts to observe and record about the pupils in any school are *age* and *grade*. If they are recorded as in Table 1 on the following page, even these simple items tell much about the working of the school in question. Thus, looking at each vertical column, one sees at once the enormous variability in age of those who reach the same grade or educational standard. In the third grade in Connecticut in 1903, children were reported as young as four years and as old as seventeen. To include nine tenths of the children in this grade, a range of five years is required. Over three years are required to include even three fourths of them. In the fourth grade, only a quarter of the children are of the so-called "normal" age of ten; a fifth of them are twelve or over; in a class of forty there will usually be one child fourteen or more years old and four children eight or less. In the elementary school, even in the lower grades, there are many adolescents, beginning to be moved by the instincts of adult life. In the high school are many boys and girls under fifteen who, though intellectually gifted, are physically, emotionally, and in social instincts little children.

The reader may well think through each column of this table, considering the practical significance of the variability of each grade. Grades 9–13, it will be noted, are ambiguous. Grade 9 means in some cities and towns the last grammar grade, and in others the first high-school grade; grade 10 means a combination of the first high-school grade of some, and the second of other, cities; and so on for grades 11, 12, and 13.

TABLE 1

THE DISTRIBUTION OF THE CHILDREN IN THE PUBLIC SCHOOLS OF CONNECTICUT IN 1903, BY AGE AND BY GRADE

Age	Grades															
	Kg.	1	2	3	4	5	6	7	8	9	10	11	12	13	All Grades	
3 and 4	2,220	834	16	1											3,071	3–4
5	3,337	5,330	176	17											8,860	5
6	1,229	9,521	1,782	180	33	2									12,747	6
7	302	6,743	5,456	1,520	225	12	2		1						14,261	7
8	45	3,044	5,481	4,620	1,470	238	47	2	1		1				14 949	8
9	17	968	3,109	4,929	3,828	1,182	287	51	11	4	1				14,387	9
10	9	442	1,389	3,293	4,433	3,200	1,227	237	48	4	1				14,283	10
11	4	194	541	1,644	3,157	3,691	2,592	1,076	259	44	7	2			13,211	11
12	3	98	290	849	1,981	3,011	3,228	2,247	985	243	96	6			13,037	12
13	2	92	150	420	1,100	1,976	2,680	2,858	1,868	829	283	47	1		12,306	13
14	1	18	48	113	291	600	1,085	1,582	1,920	1,239	665	189	25	2	7,778	14
15	1	5	9	25	67	114	293	597	998	901	752	445	192	15	4,414	15
16			1	3	12	21	56	141	327	450	599	554	328	76	2,568	16
17			1	1	2	8	10	25	67	127	301	367	430	158	1,497	17
18						1	2	2	10	31	79	173	287	186	771	18
19 and over					1				1	7	15	54	95	108	281	19+
All Ages	7,170	27,289	18,449	17,615	16,600	14,056	11,509	8,818	6,496	3,879	2,800	1,837	1,358	545		

The variability of age within the same grade is seen more clearly in Table 2, in which the percentages of each grade at each age are given, with the extreme and infrequent ages omitted.

One special feature of the variability shown by an age-grade table is the existence and amount of what has been called "retardation"—that is, of *old* children in *early* grades. If we call the "normal" age that a child should be in grade 1, six, in grade 2, seven, and so on, and call children who are below this so-called normal age for their grade, "Retarded," then in Connecticut in 1903 two-thirds of the children in grades 3, 4, and 5 were retarded a year or more. The recent agitation about such so-called retardation dates from the exploitation of this feature of the age-grade tables of certain cities, to which public attention was called by Bryan ['07] Cornman ['08] and Thorndike ['08], and which was later made the subject of a vigorous propaganda by Ayres ['09].

The next important fact shown by the age-grade table is the age at which pupils leave school. Looking down the "Total" column at the right of Table 1, one sees that, beginning at eleven years, the number of pupils of any year-age diminishes. Supposing the population of the state to have been such that the number of children who entered school was the same during each year from 1890 to 1903, and disregarding the transfer to and from private schools, it appears that nearly half of the children left school before they were fourteen, and nearly five-sixths before they were sixteen. These figures would have to be corrected somewhat elaborately for the growth of population in the state, for the death rate during these ages, for the date at which the census was taken, for the private-school transfers and for other influences, before an estimate of the expectation of school life for a Connecticut child could be made accurately. But they would give the first raw material for such an estimate, and from such enrollments distributed as to age, the first calculation of the actual age-retention and elimination in American cities was made in 1908.

TABLE 2

THE DISTRIBUTION OF THE ENROLLMENT OF EACH GRADE BY AGE. ON A BASIS OF 1,000 FOR EACH GRADE. CONN., 1903

Age	Grades														
	Kg.	1	2	3	4	5	6	7	8	9	10	11	12	13	
3 and 4	310	31													3–4
5	465	195	10												5
6	171	349	96	10											6
7	42	247	295	86	14										7
8	6	112	296	263	89	17	4								8
9		35	168	280	231	84	25	6							9
10		16	75	187	267	228	107	27	7						10
11		7	29	93	190	263	225	122	40	11					11
12			16	48	119	214	281	255	152	63	34				12
13			8	24	66	140	233	324	288	214	101	26			13
14				6	18	43	94	179	296	319	238	103	18	4	14
15					4	8	25	68	154	232	269	242	141	28	15
16							5	16	50	116	214	302	241	140	16
17								3	10	33	108	200	316	290	17
18										8	28	94	211	341	18
19 and over											5	29	70	298	19+
All ages	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	

Such an age-grade table also gives the most convenient approximate estimate of the number of children beginning school per year. This important fact, which we may call the *educational birth rate*, is almost never reported from direct measurements. The number at age 8 or the number at age 9 is found to be, over a series of years, a fair rough measure of it.

Such an age-grade table gives data from which, with the aid of other facts, the degree of education, measured by the grade reached before leaving school, may be calculated for the children of a community. This retention to, or elimination at, a given grade is, in many ways, more important than retention to, or elimination by, a given age.

Looking along the horizontal row of totals, one sees that the numbers drop, there being about half as many in the ninth grade as in the seventh, and about half as many in the eleventh as in the ninth. If population were stationary, if repeating and skipping were each as frequent in any one grade as in all others, and if certain other minor conditions were fulfilled, the drop in the figures from one grade to the next would measure the elimination of pupils at that point. As will be shown later, the expectation that a child of any given school system will continue to any given grade can be calculated by a study of the age-grade table in connection with changes in population, the frequency of skipping and repeating in each grade and other facts.

It is worth while to note that the fact recorded—of half as many children again in the first as in the second or third grade—is a common and somewhat curious feature of school statistics. This enormously greater reputed enrollment in grade 1 than in any other grade does not, of course, mean that half of the children in Connecticut did not get beyond grade 1. It means in part that many more children repeated grade 1 than later grades, in part that almost no children skipped grade 1. But it also probably means certain possible errors of the recording officers. The

enrollment statistics of grade 1 are in general much less reliable than those of later grades. For instance, one should, when the frequency of non-promotion in each grade is given, be able to get approximately the enrollment of grade 1, by adding to that of grade 2, the excess of repeating and the deficiency of skipping in grade 1 as compared with grade 2. But often the recorded enrollment is far above the result so obtained.

Finally, an age-grade table tells something about the kind of pupil who is eliminated from school in an early grade. For example, start in Table 1 with the thirteen-year-olds who are in grades 2, 3, 4 and 5 on the the one hand, and in grades 7, 8, 9 and 10 on the other. Comparing the thirteen-year-olds in grades 2, 3, 4 and 5 with the fourteen-year-olds in grades 3, 4, 5 and 6, we find a drop to 57.2 per cent, or a difference of 43 per cent. Comparing the thirteen-year-olds in grades 7, 8, 9 and 10 with the fourteen-year-olds in grades 8, 9, 10 and 11, we find a drop to only 68.7 per cent, or a difference of only 31 per cent.

Similarly between fifteen-year-olds in grades 2, 3, 4 and 5 and sixteen-year-olds in grades 3, 4, 5 and 6, there is a drop to 42.8 per cent, or a difference of 57.2 per cent; while between fifteen-year-olds in grades 7, 8, 9 and 10 and sixteen-year-olds in grades 8, 9, 10 and 11 there is a drop to only 59.4 per cent, or a difference of only 30.6 per cent. In general, *at a given age the "retarded" pupils are much more often eliminated.* Further study would show that this means that at any age the pupils of less interest in, or ability at, scholarship are more often eliminated.

§ 2. The Elimination of Pupils from School [1]

Introduction

What pupils stay in school, how long they stay, what grades they reach, and why they leave, are questions of obvious significance for any educational system. The facts concerning them decide in great measure the service performed by the system. A system in which laziness and stupidity eliminate pupils is better than one in which they are eliminated by poverty. A system which holds 60 out of 100 till the eighth grade is presumably better or more fortunate than one which holds only 20. If two systems keep pupils in school equally long so far as years go, and one of the two systems gets 15 out of 100 through the high school while the other gets only 5, the latter system is probably somewhere guilty of waste.

The facts really needed for an adequate study of these general questions are the educational histories of 500 to 1,000 children (chosen at random from the 6 to 8-year-olds) in each of 20 or 30 communities, each of the individual histories to cover at least the years from 8 to 18. If these histories were studied in connection with the characteristics of each community's educational endeavor, and in connection also with the economic, social, and intellectual environment of the individuals concerned, we could know exactly the general tendency of elimination in this country, the variability of different communities in respect to it, the causes of these variations, and at least some of the ways to keep more of the children and more of the worthy children in school.

[1] The text of § 2 is composed in the main of quotations from a monograph with the same title by E. L. Thorndike which appeared in 1908 as Bulletin No. 4, 1907, Whole Number 379, of the U. S. Bureau of Education.

For four years the author has been gathering and studying such data as he could obtain from printed reports and the like concerning various aspects of the general question, in the hope of eventually making specific studies in some cities with data of the desirable sort just described, and so being able to interpret the facts already given in print. It has proved impracticable for him to obtain these educational life histories of individuals. It therefore seems best to report briefly the facts at hand, in the hope that others may be encouraged to secure and study the more important individual histories.

The facts at the basis of this report are:

(1) Registration statistics by grade in elementary and high schools.

(2) Registration statistics by age in elementary and high schools.

(3) Registration statistics by grade and sex in high schools.

(4) Registration statistics by age and sex in high schools.

(5) Registration statistics by grade in colleges.

Such facts are instructive, provided one uses them with full cognizance of their meaning and likelihood of error. Otherwise they may be seriously misleading. For example, the registration for grades 5 to 8 in Springfield for 1903 was as follows:

Grade 5	1,072	Grade 7	799
Grade 6	986	Grade 8	633

This does not mean that of 1,072 pupils in the fifth grade 633 will remain on till the eighth; for it to mean that, there must be a stationary school population. The eighth grade in 1903 should be compared not with the lower grades of 1903, but with the fifth grade of 1900, the sixth grade of 1901, and the seventh grade of 1902. Doing this, we get (instead of 1,072, 986, 799, and 633) 904, 892, 768, and 633.

But these figures, though far nearer the truth, are by no means necessarily a true measure of the retention of the fifth grade pupils of 1900; for some of these 904 pupils of 1900 undoubtedly were held back two years in some grade and yet are staying on in school and will be in the eighth grade, but in 1904; conversely with some promoted rapidly. Also, some may have stayed out of school for a year or more and then reëntered. Also, if 1,000 families, each with a child of about 13, moved to Springfield in 1902, the 633 of the 1903 eighth grade would not represent those remaining from the 904 of the 1900 fifth grade; in fact, conceivably, not one of them might be left in school, the 633 being entirely composed of the children of these new families.

In the second place, a true estimate of elimination requires not only public school statistics, but also measurements of the interchange between public and private schools. Luckily, this correction is in most American cities of little account.

My report for education below the colleges is based on data from public schools only. My estimates concern the school careers of children entering the public schools of cities of this class. Those who leave to enter private schools are probably balanced by those who enter later grades from the parochial and other private schools. The interchange between public and private schools may be, however, of varying influence in different cities, and unless we can estimate it accurately for each our comparison of individual cities will be to some extent in error.

In the third place, if we are to make statements concerning individual educational systems, such as individual cities, without risk of being unjust, we need figures from enough years to give a result precise enough to prevent rating any one city above any other when in the long run it would belong below it. Data that give a precise notion of the general tendency of all urban communities together may give a very rough approximation for any single city.

Elimination by Ages: Results

My study concerns 8-year-olds (1) of large cities, (2) in the public schools, and (3) in the case of cities where separate schools for the colored race are maintained, of the white children only. The data are, roughly, for the period from 1890 to 1900. I also do not count elimination by death. Such being the conditions, I estimate that of one hundred 8-year-olds living long enough, the number retained till any given age is as follows:

Percentage of 8-year-olds retained

	Per-centage.		Per-centage.
10 years old	100	15 years old	47
11 years old	98	16 years old	30
12 years old	97	17 years old	16.5
13 years old	88	18 years old	8.6
14 years old	70		

Figure 1 shows the amount of elimination with respect to age at a glance.

These figures give the proof of the provision in regular day schools for boys and girls who, in England and Germany, have to be at work with only scanty schooling in special classes. They show the readiness of a large proportion, almost a majority, of parents to neglect the opportunity to withdraw their children at the legal age limit. They also show the very considerable number of the violations of the law, a number which would probably be somewhat increased if false reports of age were not present. The legal age limit has evidently a less effect than we have been in the habit of supposing. Its service is now to prevent the folly of a minority of families rather than to set a standard for the community as a whole.

The importance of the fact that pupils stay so long and yet progress only to so low grades [1] has been recognized by wise

[1] For the period for which this estimate of elimination by age was made, the elimination by grades was estimated as such that the general tendency of Amer-

administrative officers. It means, of course, that many pupils are held back unduly, or that the work which they are given to do but fail to do is unsuited to them. Rapid-promotion systems, special classes, careful regulation of promotion, the substitution of industrial and trade schools or courses for the regular school,

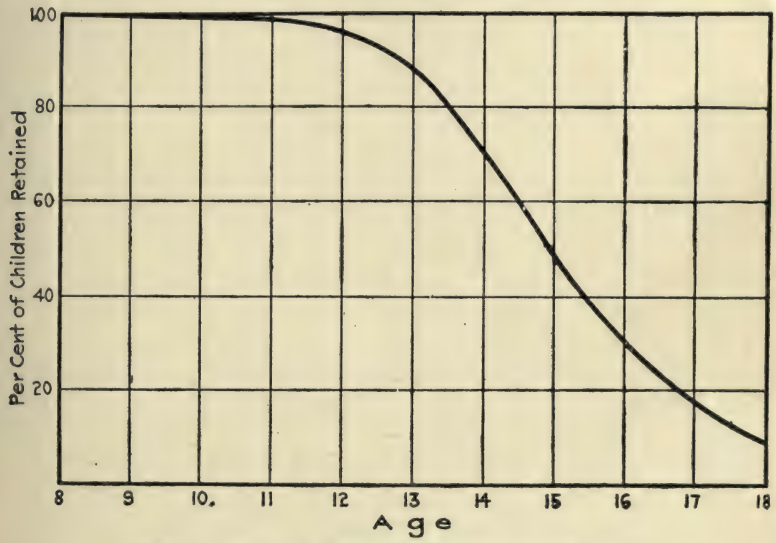


FIG. 1. Amount of elimination with respect to age.

and the like will be used by efficient school officers to make retention to a late age mean also retention to a valuable education.

At the first sight it seems strange that so many pupils should

ican cities of 25,000 and over was to keep in school out of 100 entering pupils (here, and throughout the report, unless the contrary is specially stated, "children" or "pupils" includes white pupils only, in cities where colored pupils are taught in separate schools) who lived long enough to complete the course, 90 till grade 4, 81 till grade 5, 68 till grade 6, 54 till grade 7, 40 till the last grammar grade (usually the eighth, but sometimes the ninth, and rarely the seventh), 27 till the first high-school grade, 17 till the second, 12 till the third, and 8 till the fourth. Figure 2 shows graphically this general tendency.

stay in school till 10, 11, 12, 13, and 14, and so few till the fourth, fifth, sixth, and seventh and eighth grades. How, for instance, can we have 97 per cent of the 8-year-olds staying till they are 12, but only 68 per cent of those in the second grade staying till the sixth grade?

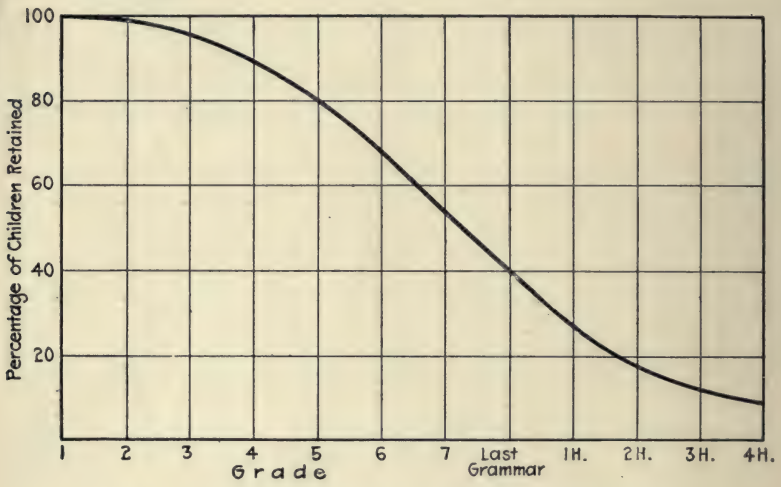


FIG. 2. Amount of elimination with respect to grade reached.

The main cause of this fact is that the elimination of pupils in any grade, but specially in the lower ones, is largely of older pupils. If we recall, for instance, the fact that in the sixth school grade in Connecticut in 1903 as many pupils were 13 or over as were under 12, we may understand that the 32 per cent of elimination before the sixth grade could take place largely at the expense of children 13 or more years old.

I have calculated what would be the grade retention if the age retention were 1,000 7 years old, 1,000 8 years old, 1,000 9 years old, 998 10 years old, 980 11 years old, 970 12 years old, 880 13 years old, 700 14 years old, 470 15 years old, 300 16 years old, 165 17 years old, and 86 18 years old (with the proper number 5

and 6 years old added), on the hypothesis that the per cents of children of given ages in the different grades is as found in the 1903 Connecticut report. The resulting figures are close to those obtained by my own study. The study of the age retention thus really verifies the approximate accuracy of the results of the study of grade retention.

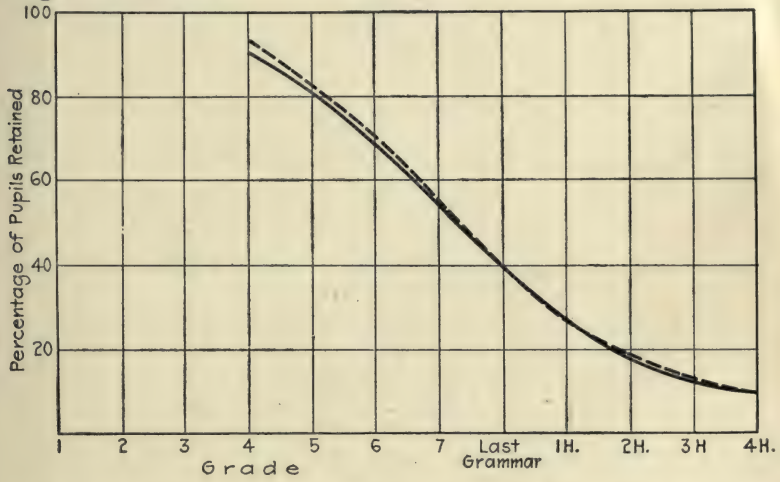


FIG. 3. Verification of the approximate accuracy of the estimate of elimination by grade reached shown in Fig. 2. The dotted line shows the retention in the different grades (4 to 4 H. S.) as calculated on the basis of the age retention stated in the text and the age-grade distribution found in Connecticut in 1903. The continuous line shows the retention in the different grades as stated in the text.

The essential facts are given in Figure 3 and the legend beneath it.

Elimination by Ages: Methods: The Original Data of Age Populations

Table 3 gives a sample of such data as I gathered concerning the number of pupils of each year-age in the public schools of 25 cities.

TABLE 3

THE DISTRIBUTION BY AGE OF PUPILS IN THE PUBLIC DAY SCHOOLS (ELEMENTARY AND SECONDARY) OF THREE CITIES

	AGE												
	7	8	9	10	11	12	13	14	15	16	17	18	19
Baltimore:													
1897	6,953	7,573	7,610	7,537	7,113	6,817	5,486	3,876	2,406	1,230	642	299	99
1898	7,325	7,369	7,788	7,757	7,099	6,889	5,471	3,751	2,392	1,274	602	289	96
1901	7,132	7,710	7,793	8,086	7,371	6,755	5,519	3,810	2,284	1,109	556	264	123
Boston:													
1894	6,139	6,503	6,224	6,298	5,825	5,992	5,808	4,707	3,308	2,053	1,121	571	*a*200
1896	6,398	6,520	6,665	6,432	6,100	6,045	5,744	4,787	3,383	2,052	1,113	628	*a*236
1897	6,569	6,692	6,807	6,733	6,178	6,244	5,890	3,909	3,563	2,261	1,221	621	*a*248
1903	8,233	8,170	7,916	8,035	7,669	7,601	7,068	5,568	3,636	2,352	1,378	687	*a*234
Cleveland:													
1895	5,530	5,630	5,258	5,333	4,743	4,562	3,920	2,980	1,648	976	635	.....	.....
1896	5,957	5,953	5,443	5,493	4,725	4,882	4,260	3,092	1,717	980	580	.....	.....
1897	6,277	6,096	5,670	5,509	4,865	5,081	4,819	3,157	1,646	1,002	650	.....	.....
1898	6,421	6,325	5,860	5,543	5,149	5,178	4,937	3,428	1,864	1,068	645	.....	.....
1900	7,067	6,878	6,242	5,982	5,251	5,440	4,935	3,732	2,006	1,093	674	.....	.....
1901	7,096	6,961	6,618	6,191	5,599	5,561	4,794	3,740	1,988	1,058	607	.....	.....
1902	7,030	7,208	6,723	6,639	5,763	5,693	4,973	3,497	1,946	1,086	635	.....	.....
1904	7,572	7,694	7,229	7,238	6,555	6,705	6,011	3,839	3,027	1,085	768	.....	.....

a Approximate.

Table 4 gives the facts for ages of 10 and over in percentages on the number of 7, 8, and 9-year-olds divided by 3, which is practically the same as the number of 8-year-olds, a single set of such percentages being calculated from all the records together for any city.

TABLE 4

THE PER CENTS WHICH THE 10-YEAR-OLDS, 11-YEAR-OLDS, ETC., IN SCHOOL, ARE OF THE NUMBER OF 8-YEAR-OLDS APPROXIMATELY, BY GIVING THE PER CENTS WHICH THEY ARE OF THE SUM OF THE 7, 8, and 9-YEAR-OLDS DIVIDED BY 3. (25 CITIES)

	Age										
	Years reported	10	11	12	13	14	15	16	17	18	19
Baltimore	1897, 1898, 1901	104.0	96.4	91.3	73.3	50.9	31.6	16.1	8.0	3.8	1.0
Boston	1894, 1896, 1897 1903.	99.6	93.4	93.6	88.8	72.4	50.3	31.6	17.5	9.1	*a*3.3
Cleveland	1895, 1896, 1897 1898, 1900, 1901 1902, 1904	93.3	82.3	83.4	73.4	54.0	29.3	16.4	10.1	.....	.....
Chicago	1900, 1901	90.4	83.5	79.8	67.9	65.3	31.4	19.7	.....	.....	.....
Columbus, Ohio	1899, 1902	98.3	88.5	91.7	86.1	73.1	51.2	35.0	21.4	10.4	3.9
Dayton	1900, 1901	97.2	91.2	88.9	85.3	64.7	39.4	25.2	17.6	11.8	8.1
Denver	1897, 1898, 1899 1900, 1901.	98.7	91.8	90.4	81.8	73.8	59.9	44.1	28.9	18.2	9.0
Fitchburg	1901	84.4	86.7	84.4	93.1	51.5	42.6	29.2	14.6	6.2	1.0
Grand Rapids	1899, 1901, 1903 1904.	102.0	95.6	94.2	93.2	85.3	71.9	42.7	21.5	14.6	7.3
Jersey City	1897, 1898, 1899	97.0	90.0	89.1	76.2	55.0	33.7	13.0	4.5	2.1	0.8
Johnstown	1903	107.0	99.7	86.6	88.9	62.8	40.3	19.1	9.2	6.3	2.3
Kansas City, Kans.	1900, 1901	106.4	101.5	99.1	88.4	74.9	54.8	38.4	25.5	12.8	4.8
Kansas City, Mo.	1900, 1901	102.1	92.4	91.1	83.5	71.0	57.0	38.3	24.1	13.6	5.3
Little Rock	1895, 1896	101.6	100.0	95.4	86.3	77.3	57.5	36.7	16.6	8.2	2.3
Los Angeles	1899, 1900, 1901	101.4	91.9	89.8	77.7	67.9	49.1	31.8	19.2	10.1	8.9
Louisville	1896, 1898	93.5	80.9	85.3	74.1	53.6	42.1	19.3	12.7	6.9	2.8
Minneapolis	1898, 1900, 1902 1904.	98.8	91.8	91.0	81.8	70.0	50.6	39.5	19.8	11.3	5.0
Newark	1901, 1902, 1903	94.0	83.8	80.4	59.7	35.7	18.7	10.4	5.2	2.8	1.6
New Orleans	1901, 1902	99.3	88.3	84.6	70.0	*a*51.3	*a*23.2	*a*13.4	*a*8.2	*a*3.4	*a*2.3
Omaha	1898, 1899	89.8	79.7	81.8	74.7	59.2	42.8	27.2	14.7	6.6	2.8
Springfield, Mass.	1899, 1900, 1901 1902, 1903.	91.0	88.9	87.0	85.0	76.3	58.5	39.0	24.1	14.5	6.9
St. Joseph	1891, 1892	11.5	92.5	78.1	72.3	56.4	48.8	.....	.....	.....	.....
St. Paul	1893	87.4	73.7	74.2	61.9	54.3	35.8	26.2	10.3	7.7	3.4
Toledo	1894, 1899	85.3	74.6	76.3	67.6	58.8	37.6	21.5	10.8	4.1	1.7
Troy	1891, 1895, 1896	12.0	92.5	100.0	79.0	63.9	35.7	20.1	12.6	7.6	4.8
Medians	.....	98.7	91.2	88.9	79.0	63.9	42.6	26.7	15.0	7.8	3.4

a Approximate

The Reliability of Age Data from a Few Years as Representative of the General Tendencies of Cities

The general tendency of a city as shown in a long series of years is of course only approximately represented by the figures of Table 4 calculated from only a few years' statistics.

The closeness of the approximation can be calculated by well known formulæ based on the theory of probability. I have, to this end, calculated the percentages of 10, 11, 12, etc., year-olds on $\frac{7+8+9 \text{ year-olds}}{3}$ for each year's record from Springfield (five years), Minneapolis (four years), Cleveland (eight years), and Dayton (two years); and, from these individual-year percentages, have calculated the probable closeness of the approximation for a record from one year only, for a record from two years, etc. The chances are even that the results obtained for 10-year-olds will not diverge from the true per cents by more than—

1.7 per cent of the per cent obtained, one year's records being used.
1.2 per cent of the per cent obtained, two years' records being used.
1.0 per cent of the per cent obtained, three years' records being used.
.8 per cent of the per cent obtained, four years' records being used.
.8 per cent of the per cent obtained, five years' records being used.

For other ages the corresponding figures are obtained by dividing a given constant, computed for each age, by the square root of the number of years' records used. The value of the constant for each age is as follows:

	Value of constant		Value of constant
11-year-olds	1.9	15-year-olds	4.8
12-year-olds	2.6	16-year-olds	5.3
13-year-olds	3.5	17-year-olds	5.7
14-year-olds	4.1		

To get the figures such that the chances are 99 to 1 against greater divergence, multiply the figures for even chances by $3\frac{3}{4}$.

For example, the obtained result from Denver for 16-year-olds is 44.1 calculated from five years' records. The chances are even that the true per cent for Denver 16-year-olds will not diverge from 44.1 by more than $\frac{5.3}{\sqrt{5}}$ per cent of 44.1, or 1.1. That is,

the chances are even that the true per cent will lie between 43 and 45.2.

The chances are even that the medians calculated from these 25 cities will not diverge from the medians of the entire group of cities from which these are a random sampling by more than the following per cents for the different ages:

	Per cent		Per cent
10-year-olds	0.85	15-year-olds	1.8
11-year-olds	.9	16-year-olds	1.8
12-year-olds	.75	17-year-olds	1.1
13-year-olds	1.35	18-year-olds	.55
14-year-olds	1.8	19-year-olds	.3

The Process of Estimating Actual Elimination from the Facts of School Age Populations

The figures of Tables 3 and 4, obtained from the contemporaneous age populations, need to be viewed in the light of the fact that in these cities the number of children 10, or 11, or 12, years old is not the same as the number of 8-year-olds. Just what the ratios are in each city is not known, nor are the ratios for the cities as a group known more than approximately. An accurate census by year ages is needed for this. By the natural "birth-rate minus death-rate" increase, there are, in the entire country, for every 1,324 from 5 to 9, 1,175 from 10 to 14, and 1,057 from 15 to 19 (Abstract of 12th Census, p. 12); that is, 88.7 and 79.8 per cent, respectively. In the cities as a group, this condition holds approximately for the 10 to 14 group, but not at all for the 15 to 19 group, the 1890 and the 1900 censuses giving, for the corresponding percentages, approximately 91 and 96. These differences are due to a very slight degree probably to differences between the urban and the general birth rate, and to a large degree to the fact that inter-migration of city and country children gives the cities more boys and girls from 10 to 14, and many more from 15 to 19, than it removes. Individual cities vary very widely from

the general tendency of the group, some cities having as many children 10 to 14 as 5 to 9, and others only 80 per cent as many. The variation in the ratio which the number of children 15 to 19 bears to the number 5 to 9 is still more variable. I shall not, in general, try to estimate the number of children at each year age in each city,but shall do so only for each age group as a whole.

Using the data given in the census reports for 1890 and 1900, I find that the median per cent which the ten to fourteen-year-olds were of the 5 to 9-year-olds in the cities of Table 4 was 94 in 1980, and 88 in 1900. The median per cent which the 15 to 19-year-olds were of the 5 to 9-year-olds in these cities was 99 in 1890.

We may then fairly take the percentages which the numbers of inhabitants of each age from 10 on are to the number of 7, 8, and 9-year-olds divided by 3 as:

	Percentage		Percentage
10 years old	96	15 years old	90
11 years old	94	16 years old	92
12 years old	92	17 years old	98
13 years old	90	18 years old	102
14 years old	89		

We might then, to get for the group the per cent of the children of each age that are in school, divide through the figures representing the central tendency of cities for ages 10, 11, 12, etc., in order, by 0.96, 0.94, 0.92, etc.,—that is, divide the 98.7 of Table 4 by 0.96, the 91.2 by 0.94, the 88.9 by 0.92, and so on. The figures thus obtained would not, however, be truly significant for the years from 14 on, for the reason that among the 15 to 19-year-olds migrating to the city, very many *have already been eliminated* from school in the country, and come to the city specifically to work. We should have in our result a measure, not of the elimination in cities, but of the elimination in cities plus the nature of the selection by cities from other localities. On the other hand, to take ratios based exclusively on the "birth-rate minus death-rate" increase, whereby the 15 to 19-year-olds are only 79.8 per

cent of the 5 to 9-year-olds, would be unfair, for the reason that many families move to the city so that older children can have the advantage of the high school; moreover some of the pupils counted in the city school populations, especially in the late years, come in daily from the surrounding country. Though perhaps nine out of ten of the "15 to 19 increase by immigration" come to the cities to work, a few come specifically to go to school.

On the whole, in order to compare the numbers actually in school with the numbers that would be if every child in the cities who is in school at 8 years of age, kept on in school till he was 19 (except for death), and if no one moved away from, or moved into, the cities, we may fairly balance the results of death and of immigration on the school age population records after 14, and regard the per cents with which the 98.7, 91.2, 88.9, etc., of Table 4 should be compared as follows:

School expectation if no elimination existed

	Percentage		Percentage
10 years old	96	15 years old	90
11 years old	94	16 years old	90
12 years old	92	17 years old	90
13 years old	90	18 years old	90
14 years old	90		

The percentages retained then rise from 98.7, 91.2, 88.9, etc., and become—

Percentage of $\frac{7+8+9}{3}$ *retained*

	Percentage		Percentage
10 years old	103.0	15 years old	47.0
11 years old	97.0	16 years old	30.0
12 years old	97.0	17 years old	16.5
13 years old	88.0	18 years old	8.6
14 years old	70.0		

The absurdity of the 103 per cent is probably due to the tendency of the children to state their age as 10 if it is 9 or 11, more

often than to state it as 9 if it is 8 or 10, or as 11 if it is 10 or 12; and perhaps to the late entry to the public schools of a few children. We may properly correct for this, making the percentage of $\frac{7+8+9}{3}$ retained as follows:

Corrected percentage of $\frac{7+8+9}{3}$ *retained*

	Percentage		Percentage
10 years old	100.0	15 years old	47.0
11 years old	98.0	16 years old	30.0
12 years old	97.0	17 years old	16.5
13 years old	88.0	18 years old	8.6
14 years old	70.0		

These figures represent as good an approximation to the retention of children in city public schools, such as those listed, at the year 1900, as I can get from the data at hand without elaborate hypotheses for correction. It is certainly not far from the truth to say that of pupils entering these city schools one-tenth leave before 13 years of age, one-fourth before 14, one-half before 15, two-thirds before 16, and five-sixths before 17.

The reader will understand that these figures for cities may be much too high for the country at large. Even in Connecticut, a State fortunate in its means of education, the corresponding figures [1] are—

	Percentage		Percentage
10 years old	99.5	15 years old	32.0
11 years old	94.0	16 years old	19.0
12 years old	94.0	17 years old	11.0
13 years old	91.0	18 years old	6.0
14 years old	57.0		

The Variability Among Cities with Respect to Elimination by Age

The student who is desirous of a strict account of the variabil-

[1] From the 1903 report of the State Board of Education, pp. 184–185, reduced to per cents of the number of 8-year-olds and corrected by the population statistics of the census of 1900.

ity of cities in respect to elimination by age may, by using the data given by Thorndike ['08, Tables 17 and 19], and such other data as he may secure from city reports, correct each city's school population statistics separately and then compare them. I shall do this only for three high and three low ranking cities and without attempt at perfect precision.

The age population percentages for Cleveland,[1] Jersey City, and Newark schools, as given in Table 4, are:—

CITY	AGE								
	10	11	12	13	14	15	16	17	18
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Cleveland	93.3	82.3	83.4	73.4	54.0	29.3	16.4	10.1	.....
Jersey City	97.0	91.0	89.0	76.2	55.0	33.7	13.0	4.5	2.1
Newark	94.0	83.8	80.4	59.7	35.7	18.7	10.4	5.2	2.8
Average[a]	94.8	85.7	84.3	69.8	48.2	27.2	13.3	6.6	4.0
Median	94.0	83.8	83.4	73.4	54.0	29.3	13.0	5.2	2.8

a Approximate

Those for Denver, Grand Rapids, and Springfield are:—

CITY	AGE								
	10	11	12	13	14	15	16	17	18
Denver	98.7	91.8	90.4	81.8	73.8	59.9	44.1	28.9	18.0
Grand Rapids	102.0	95.6	94.2	93.2	85.3	71.9	42.7	21.5	18.0
Springfield	91.0	88.9	87.0	85.0	76.3	58.5	39.0	24.1	13.6
Average	97.2	92.1	90.5	86.7	78.5	63.4	41.9	24.8	15.4
Median	98.7	91.8	90.4	85.0	76.3	59.9	42.7	14.1	14.6

The question is as to how far these extreme individual differences are due to differences in the rate of growth of the cities, and how far they are due to real differences in the educational character of the cities. The percentages which the number 10 to 14 and the number 15 to 19 are to the number 5 to 9 for those cities are:

[1] Baltimore makes a lower record than Cleveland, but as this may be due in large measure to the colored population it seemed better not to include it.

CITY	AGE		CITY	AGE	
	10–14	15–19		10-14	15-19
Cleveland	86.5	89.0	Denver	88.4	88.0
Jersey City	84.2	83.0	Grand Rapids	89.1	90.0
Newark	85.4	86.0	Springfield	86.1	90.0
Average	85.4	86.0	Average	87.9	89.3
Median	85.4	86.0	Median	88.4	90.0

It thus appears that the superiority of the record by age populations of the second group of cities is in a slight degree due to the fact that they have more children 10 to 18 to draw from, approximately 4 per cent more. If the age populations of the former group are multiplied each by 1.04, this disadvantage is removed. The difference thus made is very slight.

It is also true that Newark and Cleveland have flourishing private schools, which take from the public schools more old pupils than they return in exchange, and which eliminate a very small percentage of their pupils compared with the public school per cents. Springfield, Grand Rapids, and Denver do not have private schools of anywhere nearly so great influence on school attendance. Moreover, these latter cities probably gain more from the registration of out-of-town pupils in the high schools than do Jersey City and Newark. A liberal allowance for all these influences and others, except the nature of the pupils and of the school systems themselves, will be made by multiplying the figures for the former group by:

	Multiplier		Multiplier
10 years old	1.04	15 years old	1.08
11 years old	1.04	16 years old	1.10
12 years old	1.05	17 years old	1.18
13 years old	1.05	18 years old	1.20
14 years old	1.06		

We have then the following:

AGE	AVERAGE		MEDIAN	
	Cleveland, etc.	Denver, etc.	Cleveland, etc.	Denver, etc.
10 years	99	97	98	99
11 years	89	92	87	92
12 years	89	91	88	90
13 years	73	87	77	85
14 years	51	79	57	76
15 years	29	63	32	60
16 years	14.5	42.0	14.3	42.7
17 years	7.8	24.8	6.1	24.1
18 years	4.8	15.4	3.4	14.6

The cities in the second list, after this allowance, still keep one and a half times as many to the age of 14, twice as many to 15, three times as many to 16, and three and a half times as many to 17 and 18.

§ 3. Promotion, Retardation, and Elimination [1]

It is, or should be, well known that in every administrative educational unit such as a city school system or a private secondary school, the fractions of the total course nominally to be completed in equal times,—for example, the "grades" of the elementary school, or the "years" of the secondary school,—may actually require unequal periods. This requirement of unequal periods in a given system is disclosed by the fact that a large percentage of the pupils spend more time in one grade than in another. Nevertheless, a year, or half year, as the case may be, is often unwisely assumed to be the normal time for all pupils and all grades alike.

It is worth while to find out the general tendency of the elementary or secondary schools in this country in this respect. If there is a *general* tendency affecting some particular grade or grades, the fact is of importance for three reasons. If there is a general tendency such as to make the completion of, say, the second grade in the "normal" unit of time a specially difficult task for the pupil who reaches it, it would probably be advisable to eliminate this tendency. Teachers, pupils, and parents would thereby comprehend more easily the work of the school and what is necessary to its satisfactory completion. If the inequality is not removed, its existence could at least be made known to teachers, pupils, and parents. A more precise knowledge of these inequalities will also help us to estimate the nature and amount

[1] For a complete account of the investigation, certain results of which are reported in this section, see the article by E. L. Thorndike with the same title, in "The Psychological Clinic, vol. III, pp. 232–243 and 255–265. This section quotes therefrom with omissions and minor alterations.

of the retardation of pupils in school, and the elimination of pupils from school.

I propose, therefore, to measure the extent to which the different grades of the elementary and high schools are, in American cities in general, of unequal length.

The most desirable material from which to calculate this measurement would be a sufficient number of individual educational histories, stating accurately how long each pupil took to complete grade 1, how long to complete grade 2, etc. Such life histories do not exist at all in published form, and only rarely in the written records of school officers, and could be secured in adequate number only at a cost for travel, time, and clerical assistance which is for the author prohibitive. The facts can be fairly well determined, however, from city school reports, from an examination of the not infrequent statements of the number of promotions by grades. This method is the one which I shall employ.

By examining the reports of over one hundred cities and towns, covering a period of from one to five years, I have obtained fifteen statements from which one can infer, with fair accuracy, the comparative lengths of the elementary school grades for each city in question; and four in which the same is true for the high-school grades also.

Although it is the *relative* length of the different grades which is to be measured, I shall give first the actual percentages of pupils who at the end of the year fail to be promoted, and would therefore be compelled to repeat the work of the grade if they remained in school. I give them because they are original data bearing on the general problem of retardation, and are in some respects superior to the statistics of over-age pupils that have hitherto been collected. These percentages of pupils failing of promotion are calculated, when it is possible, directly as percentages of those enrolled in the grade at the end of the year, but in the case of

three cities, Chicago, Kansas City, Mo., and Rochester, the best that could be done was to infer the enrollment at the end of the year according to the method shown on pages 241–243 of The Psychological Clinic, vol. III. The calculated proportion of pupils enrolled at the end of the year who failed of promotion, is given in Table 5. I have, in what follows, used grades 2 to 8 rather than 1 to 8, because of the very great variability among cities in the proportion of failures in the first grade and because of certain eccentricities in the reports of first grade enrollments . . . .

[Here follows in the original report an account of how far these percentages of failure on enrollments are valid measures of the inequality of the grades in length and of certain conclusions which can *not* be drawn from them.]

There are other interesting considerations with respect to what these statistics of failure do *not* mean and do *not* imply. But it will be better to devote the remaining space to showing what they do mean, first, with respect to the course of study, second with respect to retardation, and third with respect to elimination.

Fortunately, in considering these topics we can use measurements of the relative length of the grades from more cities than I have reported. Ayres ['09], working with recent reports, has found records in sixteen cities, thirteen of which are not included in my list. No substantial difference appears between the results from combining all the cities in both studies, and the results from either set separately, but the reliability is, of course, about one and four-tenths times as great. I have therefore recalculated all my results, after adding the thirteen cities.

We have then as the percentages of the June enrollment which fail of promotion these central tendencies for the grades in order.[1]

[1] Using the average of the A and B halves of the grades of Manhattan and Brooklyn.

TABLE 5

PROPORTION OF PUPILS ENROLLED AT THE END OF THE YEAR WHO FAIL OF PROMOTION. 15 CITIES

GRADES	Kinder-garten	1	2	3	4	5	6	7	8	9	10	1 H	2 H	3 H	4 H
Brooklyn, N. Y., 1908	.505	.28 .145	.125 .130	.135 .135	.135 .130	.160 .150	.160 .160	.180 .160	.145 .090	....	....	....	....	....	....
Chester, Pa., 1903	.....	.23	.12	.16	.21	.23	.34	.27	.40	....	....	.24	.15	.22	.0
Chicago, Ill., 1899	.....	.36	.18	.15	.14	.18	.17	.16	.30	....	....	.20	.20	.16	.02
Columbus, Ohio, 1902	.....	.38	.10	.16	.21	.19	.18	.09	.18	....	....	.22	.20	.33	.08
Elgin, Ill., 1901	.....	.035	.05	.06	.08	.09	.09	.10	.12	....	....	....	....	....	....
Jamestown, N. Y., 1898 and 1899	.....	.24	.15	.14	.10	.12	.09	.14	.30	....	....	....	....	....	....
Kansas City, Mo., 1907	.....	.26	.11	.13	.24	.24	.28	.25	.17	....	....	....	....	....	....
Manhattan, N. Y., 1908	.510	.290 .150	.135 .130	.130 .130	.140 .150	.165 .160	.150 .145	.185 .140	.155 .170	....	....	....	....	....	....
Pasadena, Cal., 1900 and 1902	.....	.30	.17	.27	.24	.21	.22	.25	.32	....	....	....	....	....	....
Rochester, N. Y., 1897	.....	.36	.14	.16	.16	.18	.15	.22	.20	.24	....	....	....	....	....
San Francisco, Cal., 1892	.34*a*	.19	.23	.27											
Stockton, Cal., 1893	.....	.32	.08	.17	.25	.25	.23	.17	.10	0	....	....	....	....	....
Trenton, N. J., 1896 and 1897	.....	*b*	.....	.12	.19	.15	.06	.16	.06	....	.03	.09	0	0	....
Utica, N. Y., 1900, 1901, and 1902	.....	.....	.10*c*	.....	.....	.10*d*	.....	.13	.23	.26	....	....	....	....	....
Wheeling, W. Va. 1908	.....	.50	.30	.27	.35	.34	.13	.21	.08	....	....	....	....	....	....

a "Receiving class." *b* The figure for grade 1 will be very high, as the enrollment of grade 1 is very much larger than that of 2 or 3.
c For grades 1, 2, and 3 together. *d* For grades 4, 5, and 6 together.

Grades.....	2	3	4	5	6	7	Last grammar	1H	2H	3H	4H
Medians.....	12.25	14.	14.75	16.	14.25	15.	12.5	21	20	16	5

Promotion and the Course of Study

It is desirable that the course of study should be stated in terms of objective achievement grade by grade, so that teachers may know what their pupils are supposed to accomplish.[1] It would be desirable also to have this series of stages of achievement correspond to equal time-units for the average, or better, the modal child, *i. e.* to have each grade in succession represent what would be a year's or half year's work for him, *if all the children stayed to complete the course*, or if elimination were random with respect to school ability.[2] As things are, it is desirable to have each grade represent a year's or a half year's work for the modal child *who enters that grade.* There is no demonstrable tendency in the city schools *as a group* to depart from the second standard, except in the first grade. Individual cities, of course, may seem to be acting unwisely in making ostensibly equal grades really very unequal. Before passing judgment on any city, however, its practice over several years must be studied and all the circumstances determining its policy must be considered. The apparent departure of making grade 8 too short as compared with grades 3 to 7, may be entirely due to the greater elimination during the year in grade 8 of those who, if they stayed, would fail of promotion. The same fact must be considered in connection with the apparent shortness of the third and fourth years of the high school, although in this case there is perhaps a real error in

[1] With allowances, of course, first for individual differences among pupils, the work of a grade not being required to be done by all with exactly the same degree of excellence; and secondly for different courses of study for different types of pupil.

[2] The reasons for this are economy and convenience. More rapid courses for more gifted pupils might well crowd the work in some semesters and relax it in others with still greater economy. On the other hand, slower courses might at times be more economical.

making the first year of the high school too hard in comparison with the last two.

The first grade is probably longer for those who enter it than later grades are for those who enter them, although of course not nearly so much longer as it seems. The best practical solution may be, not to lessen its work, but to add an easier preparatory grade and admit to the first grade only the pupils who are ready for it—those who can reach the standard of the modal pupil in the normal time.

Promotion and Retardation

Retardation is commonly taken to mean the fact that a pupil is in a lower grade than he would be if he had begun school at the usual age and had progressed one grade each year. This raises certain difficulties in making allowance for systems which use seven or nine grades for the work usually done in eight, and lacks the objectivity and uniformity which would be gained if we could establish certain definite amounts of achievement in terms of knowledge, power, skill, etc., to be expected at each age, and could use "retardation" for the degree of inferiority of a child to the amount of achievement to be expected at his age. But until such standards of school progress are available, and until children are measured by them, we may profitably use the customary definition of retardation.

Accepting this definition of retardation, our figures suggest two facts not hitherto sufficiently emphasized. There is no support whatever in fact for the doctrine that the retarding force is greater in the early than in the later grades (grade 1 being left out of the question). Indeed, *the same pupil* will commonly spend a considerably *longer* time in grades 6, 7, and 8 than in grades 2, 3, and 4. Certain pupils are not retarded in grades 6, 7, and 8 for the sole reason that they are not there to be retarded —they have been eliminated. If all pupils stayed in school until

twenty, and the present standards of promotion were maintained, retardation would be measurably greater in grades 6, 7, and 8, than in grades 2, 3, and 4.

In these facts of promotion and failure there is no support whatever for the doctrine that retardation by non-promotion at the end of the year is an injustice to the pupil retarded. As a matter of fact, there is probably far more injustice done to the gifted one-seventh who are not promoted "doubly,"—*i. e.* allowed to complete a grade in less than a year—than is done to the one-seventh who fail of promotion in one year. Systems of promotion need to be fitted to individual differences in capacity—to be made more *flexible*—rather than to be made *easier* for those who now fail. It is of course true that teachers may exaggerate the importance of satisfactory achievement in one grade as a prerequisite for success in the following grade, that they may exaggerate the bad effects upon the zeal of a school from treating competent and incompetent pupils alike in promotion, and that they may even be stupidly unjust in a few cases. But with rare exceptions, teachers refuse promotion to a pupil only because they honestly think he is not fit to do the work of the next grade and that it is not for the common good to let him attempt it; and in a majority of cases they are right. Special industrial and trade schools in which pupils who make slow progress in the typical elementary schools could be given a trial at another sort of education, would be more to the advantage of the eleven-year-old pupils now found in the third grade, the twelve-year-olds in the fourth, and the thirteen-year-olds in the fifth grade, than such a relaxation of standards in the typical school as would allow the less scholarly children to progress in it at the speed now expected of the modal child.

Promotion and Elimination

We can estimate the number of pupils who continue to any given grade in two ways. What these are will be clearer, if we

take first an arbitrarily simple case and analyze it. Suppose first that for thirty years or so the population of a community is stationary, that no one dies before twenty-five, that there is no immigration or emigration, that one hundred pupils begin school each year, that every one stays in school until the end of the high school, and that every one begins at the beginning and spends just one year in each grade. Then the number of pupils in each grade will be one hundred. Suppose that in each grade all of those entering it spend just two years; the number in each grade will be two hundred, or twice as large as the number beginning school in one year. Suppose that in each grade 84 per cent of those entering it stay just one year, and 16 per cent just two years. After such action has been under way long enough, the numbers in all the grades will still be alike, but each will be one hundred and sixteen, or 16 per cent larger than the number beginning school in any one year.

Suppose now that of those entering each grade 84 per cent stay just one year and 16 per cent just two years, and also that in every year of the thirty years one-half of the children in the sixth grade in June leave school. Then we should have as the relative sizes of our grades in the middle of thirty year period 116, 116, 116, 116, 116, 116, 58, 58, 58, 58, etc. The proportion which grade seven was *of any early grade* would represent the proportion of pupils beginning school who continue to the seventh grade, which is, of course, one-half. The proportion which the seventh grade was *of the number beginning school in one year* (58 per cent) would be an overestimate of the proportion continuing in school to the seventh grade, for the same reason that the process in the sixth grade would give 116 per cent continuing in school. What is required is the proportion which the number beginning the seventh grade *in one year* is of the number beginning school in one year. This case may be generalized in the form of two laws:— (1) Disregarding growth of population, immigration, emigration,

and death, if the rate of progress in a grade of those entering it—*i. e.* the frequency and degree of their retardation or acceleration,—is equal for all grades, any decrease of a later as compared with an earlier grade is due to elimination; and (2) Disregarding as before all factors save retardation and elimination, if in any grade there is an excess of retardation over acceleration, the number of those found in that grade at the beginning of one year, if there has been zero elimination, will be over 100 per cent of those beginning school in one year, and by an excess proportionate to the excess of retardation in that grade.

It is therefore obvious that the percentage of pupils beginning school who are retained to any grade, cannot be measured by the percentage which the pupils in that grade are of the number beginning school in one year. If the latter figure is taken as a base, the other figure must be *those beginning that grade in one year.*

If retardation is equal in all grades, then, as we have seen, the numbers in the grades at the beginning of the year give us, by their differences, the elimination (disregarding growth of population, etc.). If it is unequal, we must correct for it. We have shown that it is approximately equal from the second grade to the third year of the high school inclusive, in the sense that in any June the proportion of pupils destined, if they stay in school, to repeat the grade, is for these grades in order .122, .14, .1475, .16, .1425, .15, .125, .21, .20, .16. But it is likely that those so destined will leave school before the next year's enrollment record is taken, more often than will those who did not fail; and it is likely that this excess elimination of those who fail will be greater in the higher grades than in the lower.

This implies the possible need of a second correction, for the excess elimination of non-promoted over promoted pupils, and for the increase in this excess as we pass to later and later years.

[Here follows, in the original report, an account of the available

facts for the calculation of the elimination of pupils who fail of promotion.]

On the whole I estimate that, of pupils failing of promotion in the last grammar grade, about one-third are eliminated before the next year's enrollment is counted; of pupils failing in the next to the last grammar grade, about one-fourth; of pupils in the sixth grade, about one-fifth; and of pupils in the fifth grade about one-sixth. If these estimates are fair, the failures in grade six, seven, and eight continue to the following year at least eight-tenths as often as those promoted. At all events, Mr. Ayres is certainly wrong in supposing that only "a few—a very few—pupils get to the seventh or eighth grade, fail of promotion, and repeat the work of the grade."[1] In Galesburg about half of the last grammar grade is made up of such repeaters, and in Kansas City about one-eighth. In Springfield about half of those failing repeat the grade, and in Williamsport four-fifths.

[The rest of the original report is given up to an estimate of the elimination grade by grade from the comparison of the number enrolled in any grade with the number beginning school in one year the appropriate number of years before. The errors made by Ayres in the use of this method are pointed out together with the resulting constant error in his estimates of elimination. I note here only the essential procedure in the method.]

Call the number of pupils at the beginning of one year in grades two, three, four, and five, Pop. 2, Pop. 3, Pop. 4, and Pop. 5, respectively.

Call the numbers failing in one year, f_2, f_3, f_4, and f_5, respectively.

Call the numbers promoted in one year, p_2, p_3, p_4, and p_5, respectively.

Call the numbers skipping one of these grades in one year, s_2, s_3, s_4, and s_5, respectively.

[1] Ayres, Leonard P., *Laggards in our Schools*, p. 93.

Call the numbers eliminated from school otherwise than by death, in the one year *before reaching the grade*, e_2, e_3, e_4, and e_5, respectively.

Then, disregarding increase of population, death, and migration into and out of the school system,

$$(1) \quad \text{Pop. } 3 = p_2 + f_3 + s_2 - s_3 - e_3$$
$$(2) \quad \text{Pop. } 4 = p_3 + f_4 + s_3 - s_4 - e_4$$
$$(3) \quad \text{Pop. } 5 = p_4 + f_5 + s_4 - s_5 - e_5$$

Call the number beginning school in one year, A.
Then:

$\frac{\text{Pop. } 2}{A} = R_2$, a per cent to be determined by observation

$\frac{\text{Pop. } 3}{A} = R_3$ " " "

$\frac{\text{Pop. } 4}{A} = R_4$ " " " etc.

From the present study, we have found:

$p_2 = 87.7$ Pop. 2 $\qquad f_2 = 12.3$ Pop. 2
$p_3 = 86.0$ Pop. 3 $\qquad f_3 = 14.0$ Pop. 3
$p_4 = 85.2$ Pop. 4 $\qquad f_4 = 14.8$ Pop. 4
$p_5 = 84.0$ Pop. 5 $\qquad f_5 = 16.0$ Pop. 5

If we assume that $s_2 = s_3 = s_4 = s_5$ (approximately), equations (1),(2) and (3) become (approximately):

$$R_3 A = 87.7\, R_2 A + 14.0\, R_3 A - e_3$$
$$R_4 A = 86.0\, R_3 A + 14.8\, R_4 A - e_4$$
$$R_5 A = 85.2\, R_4 A + 14.3\, R_5 A - e_5$$

Whence e_3, e_5 and e_5 can be calculated, subject to further corrections for skipping, the birth and death rates, migration into and out of the community concerned, public-private-school transfers and the like.

§ 4. The Incidence of Retardation

In the previous section attention was called to the common opinion that the course of study was so arranged as to be specially likely to require two years per grade in the early grades. It was shown that, on the contrary, failure of promotion would, if present standards were maintained and if all pupils stayed in school to finish the elementary school, be *less frequent* in the lower than in the higher grades.

This Dr. Blan ('11) has verified for certain cities by a study of the individual educational histories of pupils as reported by themselves, verified from school records so far as possible.

His facts are shown in Tables 6, 7, 8, and 9, Table 6 shows the frequency of non-promotion in each grade in the case of pupils who were known to have progressed in school to the eighth grade. Thus taking the top line of entries in Table 6, we read that of the pupils in the eighth grade of certain schools in New York City who had remained in the same school from the time they began school, 9.5 per cent had (according to their testimony) been held back in grade 7, 8.2 per cent had been held back in grade 6, 5.5 per cent in grade 5, 4.1 per cent in grade 4, and so on.

TABLE 6

Per Cents of Eighth Grade Pupils Failing of Promotion in Preceding Grades

Cities	Grades						
	7	6	5	4	3	2	1
New York....	9.5	8.2	5.5	4.1	3.9	1.6	1.2
Paterson.....	7.9	5.0	4.6	4.3	3.0	2.4	2.6
Elizabeth....	9.2	2.1	2.1	4.2	4.9	3.5	3.5
Plainfield	20.0	10.8	10.0	5.4	6.2	7.7	30.8
East Orange .	14.9	7.0	4.4	4.4	2.6	0.9	3.5
Medians....	**9.5**	**7.0**	**4.6**	**4.3**	**3.9**	**2.4**	**3.5**

Table 7 shows the frequency of non-promotion in each grade in the case of pupils known to have progressed in school to the seventh grade.

Tables 8 and 9 show similarly the history of the non-promotion in the case of pupils found in grades 6 and 5. Throughout, *non-promotion is for the same student more frequent, the later the grade.* Dr. Blan says:—

TABLE 7

PER CENTS OF SEVENTH GRADE PUPILS FAILING OF PROMOTION IN THE SEVENTH AND PRECEDING GRADES

Cities	Grades						
	7	6	5	4	3	2	1
New York...	12.2	8.1	7.3	5.8	3.9	2.0	2.2
Paterson.....	8.1	5.3	6.3	4.8	3.9	2.9	2.8
Elizabeth...	12.4	4.7	4.1	2.6	4.1	5.7	7.8
Plainfield....	14.0	18.4	7.2	6.8	5.3	6.3	30.0
East Orange.	11.4	7.6	8.9	6.3	2.5	3.8	5.1
Medians. ...	**12.2**	**7.6**	**7.2**	**5.8**	**3.9**	**3.8**	**5.1**

TABLE 8

PER CENTS OF SIXTH GRADE PUPILS FAILING OF PROMOTION IN THE SIXTH AND PRECEDING GRADES

Cities	Grades					
	6	5	4	3	2	1
New York.....	10.2	10.5	7.7	7.2	4.9	2.6
Paterson.....	10.3	6.5	4.8	6.2	3.2	3.5
Elizabeth.....	12.3	10.2	9.8	5.3	3.7	4.1
Plainfield.....	16.1	10.4	8.7	6.5	7.0	32.2
East Orange.....	13.8	7.7	4.6	6.2	6.2	7.7
Medians.....	**12.3**	**10.2**	**7.7**	**6.2**	**4.9**	**4.1**

TABLE 9

PER CENTS OF FIFTH GRADE PUPILS FAILING IN THE FIFTH AND PRECEDING GRADES

Cities	Grades				
	5	4	3	2	1
New York	11.2	9.2	9.6	6.6	5.0
Paterson	9.4	5.9	6.5	5.2	4.8
Elizabeth	19.0	12.1	10.1	8.1	7.2
Plainfield	15.2	13.3	6.3	5.7	39.2
East Orange	10.2	7.2	7.2	10.2	8.2
Medians	**11.2**	**9.2**	**7.2**	**6.6**	**7.2**

"That the pupils find the lower much easier than the upper grades is the definite tendency as shown in the foregoing tables. Table 6 indicates the seventh grade with a median of 9.5 per cent as having been the most difficult grade for the present eighth grade pupils. Table 7 indicates the seventh grade again with a median of 12.2 per cent as the most difficult grade for the present seventh grade pupils. In Table 8 the sixth grade pupils show the largest percentages of non-promotion in their present grade. The progress of the fifth grade pupils according to Table 9 is impeded more in the fifth grade than in any of the preceding grades. In grades five, six, and especially seven, the chances of retardation in the case of any given pupil are decidedly more than in any of the other grades. The pupil who is fortunate enough to withstand the strain of the difficult seventh grade is practically offered the assurance of success on entrance to the comparatively easy graduating class.

"Taken generally the grammar grades exert much more pressure on the pupils in the matter of retardation, than do the primary grades. It is more than probable that, were all the 'hold-

overs' in grades one through four to remain in school, the percentages of retardation in the upper grades would be still larger.

"Tables 6 to 9 record the distribution of non-promotion in hundredths of the grammar grade initial starters. These pupils represent a selected class as compared with the children migrating from school to school. It is fair to suppose that, were the histories of these shifting pupils studied, the same progressive increase in grade frequency would be the characteristic tendency.

"The records of the initial starters were obtained from the individual pupils in class room and were checked by a careful study of the individual history cards. These cards registered accurately the frequency of grammar grade retention. In the case of non-promotion in the primary grades, where the official records were not obtainable, errors of memory would necessitate some correction of the recorded percentages. Even with a generous corrective allowance there is every reason to believe that the classes would still be progressively harder from the first to the last year of the school. At any rate the burden of proof rests upon those who fancy that a pupil is more likely to suffer retardation in early than in late grades." ['11, p. 108.]

§ 5. The Causes of Retardation and Acceleration

Dr. C. H. Keyes ['11] has studied the effect upon a pupil's rate of progress through the grades of: Age at entrance to school, absence, visual defects, family conditions (including heredity) over which the schools have little control, and other influences. His study concerns the school population of a single city, Hartford, during recent years. Under the administrative arrangements of that city at that time the pupils who repeated one or more grades, those who neither repeated nor skipped, and those who skipped one or more grades, manifested the differences and absences of difference shown in Table 10.[1]

TABLE 10

The Comparison of Accelerated, "Normal" and Retarded Pupils in Age at Entrance to School, Etc.

	Arrests	Normals	Acceler-ates	Honors
Median age at entrance to Grade 1.....	6.2	6.2	6.4	6.2
Per cent entering under 5½ yrs. old.....	5.9	5.7	2.3	1.4
Per cent entering over 7½ yrs. old.....	11.4	4.2	9.5	2.0
Average annual loss in days.....	12.3	10.2	9.7	6.8
Per cent losing 4 wks. or more in some one year.....	76.6	68.4	66.6	45.3
Per cent with defective eyes.....	32.	25.	14.	16.
Per cent changing schools in the year in question.....	40.	26.	14.	0.
Per cent from non-English speaking homes	40.	27.5	17.	27.
Average deportment ranking for 6 years...	86.	86.6	92.	93.
Per cent of each class in the system.....	24.	46.	30.	

The influence of irregularity of attendance would be much clearer if measured also by the different probabilities of arrest

[1] Quoted from page 54 of *Progress Through the Grades of City Schools.*

(1) for pupils absent for different lengths of time in the year preceding that in which they repeat a grade, (2) for pupils absent different lengths of time in the two years preceding, and (3) for pupils absent different lengths of time in the three years preceding, and so on. Dr. Keyes gives data from which the first of these probabilities can be approximately estimated. They are as follows:

Ten thousand two hundred and fifteen year-records were taken, 3623 from children who at some time skipped a grade, 3000 from children who neither skipped nor repeated, and 3592 from children who at some time repeated a grade.

8,910	of the	10,215	showed	absences	of	0	to	19	days
648	"	"	"	"	"	" 20	"	29	"
303	"	"	"	"	"	" 30	"	39	"
149	"	"	"	"	"	" 40	"	49	"
306	"	"	"	"	"	" 50 days or more			

I cannot ascertain from Dr. Keyes' report how many of those absent 0 to 20 days failed of promotion that year. Of those absent 20–30 days, 92, or 14 per cent, failed of promotion; of those absent 30–40 days, 45, or 15 per cent, failed of promotion; of those absent 40–50 days, 20, or 14 per cent, failed; of those absent 50 days or more, 152, or 50 per cent, failed.[1] The last group, of course, included many who entered the first grade and were withdrawn, or who were later kept out of school for a very large fraction of the year. Consequently its percentage is not directly comparable with the other percentages.

Dr. Keyes' data also permit us to calculate similar probabilities for the class of pupils who at some time do have to repeat a grade. Given the kind of pupil who, at some time in his school

[1] Any prospective reader of Dr. Keyes' report should note that his Table 28, p. 41, is in error, by reason of a slip whereby he added in as "*arrests in the year*" all the data for "normals" absent 20 days or more.

course, fails to meet the requirements for promotion, what effect has absence? For such pupils:

1,797	cases	of	0–9	days absence	resulted	in repetition	of	that	year's	work	in	14	%	of	the	cases
851	"	"	10–19	"	"	"	"	"	"	"	"	20	"	"	"	"
231	"	"	20–29	"	"	"	"	"	"	"	"	40	"	"	"	"
114	"	"	30–39	"	"	"	"	"	"	"	"	39+	"	"	"	"
54	"	"	40–49	"	"	"	"	"	"	"	"	37	"	"	"	"
209	"	"	50 and over	"	"	"	"	"	"	"	"	73	"	"	"	"

For such pupils, loss of 50–150 days of school is thus shown to increase the chance of arrest that year by 87 per cent over what it is for one who is absent from 20 to 50 days. Loss of from 20 to 50 days apparently increases the chance of arrest that year by 130 per cent over what it is for one who is absent 0 to 20 days.

On the whole, the effect of absence is small until very large amounts of absence are reached. Since these large amounts are very rare, absence does not by itself cause any large fraction of the retardation in Hartford, not, in my opinion, a tenth of it.

Changing schools during the year about doubles the probability that a pupil will repeat the work of the year in question. Since, according to Dr. Keyes, a change of school is about eight or nine times as frequent as a loss of 50 or more days of attendance a year, the former seems a greater force in the production of retardation. Greater still is the condition of the pupil as to heredity and home environment, which the school administration can hardly be expected to control.

"It was found that nearly one-fourth of the 613 accelerates were furnished by one-fifteenth of the families represented in this class, and similarly that almost one-fourth of the arrests came from one-fourteenth of the families represented. The detailed results are shown in Table 11:

TABLE 11

SIBLINGS AMONG ACCELERATES AND ARRESTS

Accelerates			*Arrests*	
34	17 pairs	2 Brothers	28 pairs	56
42	21 pairs	2 Sisters	11 pairs	22
42	21 pairs	Brother and Sister	28 pairs	56
15	5 trios	2 Brothers, 1 Sister	3 trios	9
3	1 trio	3 Brothers	1 trio	3
3	1 trio	3 Sisters	1 trio	3
139 Accelerates, 66 Families			72 Families, 149 Arrests	

Thus 7.7 per cent of the families occasion 24.5 per cent of the arrests and 6.8 per cent of the families secure 24 per cent of the double promotions. On the other hand only thirty mixed contributions appear. The cases are as follows:

Brother who gains and sister who repeats	3 cases
Sister who gains and brother who repeats	15 "
Brother who gains and brother who repeats	3 "
Sister who gains and sister who repeats	9 "

Will any uniform course of study meet these conditions? Must not the programs of study in every grade present a minimum and a maximum schedule of work to be done? The same school nurture can never produce even approximately similar results for groups varying as widely in nature and home nurture as those represented by the accelerates and arrests involved in this study." [1]

Late entrance to school is a common cause of over-ageness, or retardation in the customary sense. Since those who enter early lose a grade no more frequently than those entering late, the latter obviously tend to contribute largely to the over-age pupils. Now late entrance is in large measure a secondary result of orig-

[1] *Progress through the Grades of City Schools*, p. 30f.

inal lack of scholarly ability. If the children who now begin grade 1 at seven or older were all sent at six or younger, very many of them would have to spend two or more years in that grade. Many of them are now kept out because they are not intellectually fit to go to school.

§ 6. The Causes of Elimination

By making use of the method of following the educational careers of individual pupils Dr. J. K. Van Denburg ['11] was able to measure the actual effects of various possible causes of elimination in the case of a thousand pupils taken at random from those entering the public high schools of New York City in February, 1906.

He got from each pupil a record like the following:

(1) _____
Last name First name Initial School Year of birth Month Day

(2) _____
Number Street Borough Number Street Borough

(3) _____
From G. S. No. Borough Father's busines- Father's nationality

(4) _____ { (1) _____ (2) _____
What do you intend to do for a living? (1) Are four years of H. S. necessary? (2) Do you intend to stay in H. S. four years?

(5) _____
Older brothers or sisters Age What are they doing?

(6) _____

(7) _____

(8) _____

(9) _____
Height Weight What serious illness have you had? When?

(10) _____
Do you have severe headaches? How frequently? Do you wear glasses?

(11) _____

(12) _____

He got further, by visiting their residences, the rentals of the apartments in which they lived, in the case of about half of the pupils. He got, for all those who stayed in school through the first term of five months or long enough to have marks for scholarship given to them, the average of their marks for the first term (or such part of it as was the basis of the marks). He also got,

from the four teachers who taught each pupil during the first term (or from so many of the four as he could), ratings of the pupil for *Ability*, *Industry* and *Results*. These qualities were defined as follows in the written instructions sent to the teachers:

> You are asked to grade the class, a list of whose members accompanies this sheet, according to their relative rank so far as you can judge in each of six characteristics. In order that this work may be uniform, a more detailed explanation of the sense in which the various terms are used is given below.
>
> 1. ABILITY. Native ability apart from success or failure in any particular subject of study. Natural brightness.
>
> 2. INDUSTRY. Application to school work whether pleasant or unpleasant. Determination to accomplish an assigned task. Stick-to-it-iveness.
>
> 3. RESULTS. General efficiency. Not only undertaking a task or a line of work, but actually accomplishing some result in it. (This does not mean reliability or trustworthiness.) . . .
>
> The method of marking is as follows: For example, take the first column. Mark the boy or girl whose native ability you consider the best in the class + 1. The pupil whose native ability you consider the poorest mark — 1. In the same way mark the next to the naturally brightest + 2, and the next to the naturally dullest — 2. In this way grade so far as possible the entire class. When you find the plus and minus rankings to approach each other so closely that you are unable to distinguish any differences, mark the remaining pupils "M."

He then kept track of every pupil of the thousand until he or she left high school, graduated, or remained four years but without graduating. "Left high school" means left the public high schools of New York City without any evidence being present that the pupil was moving to some other city or transferring to a private school within it. The approximate date of each pupil's leaving was determined.

We can thus answer for this group of a thousand either the question—"What characterizes the pupils who stay long compared with those who leave early, in respect to age at entrance, wealth of family, record for scholarship in the first few months, etc., etc.?"—or the questions—"How much longer do rich pupils stay than poor pupils?" "How much longer do pupils of

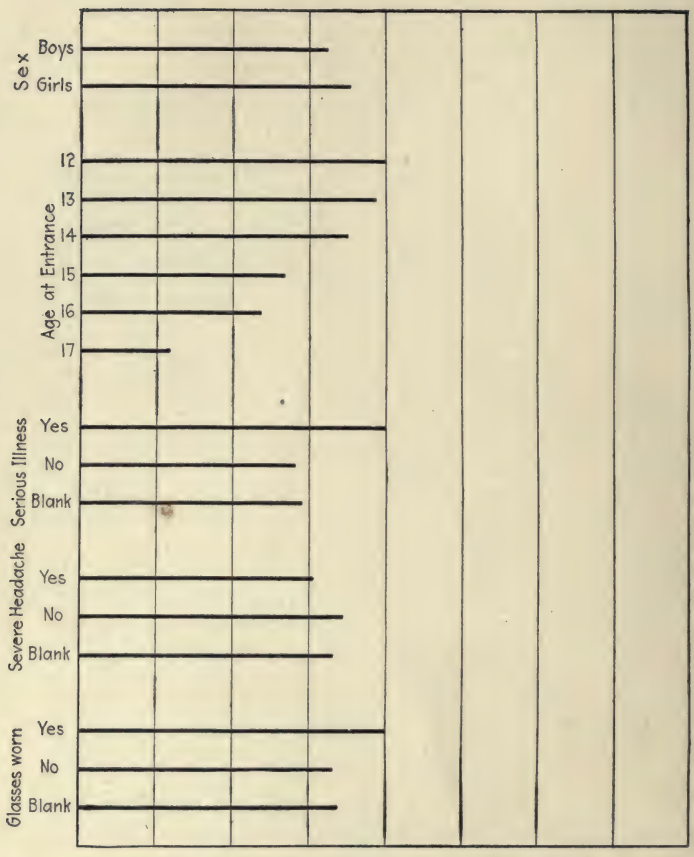


FIG. 4. Expectation of high-school life. Median length for boys and girls; for children 12, 13, 14, 15, 16 and 17 years old at entrance; for children answering "yes," "no" and "blank" to "What serious illness have you had?" and for children answering "yes," "no," and "blank" to "Do you have severe headaches?" Each centimeter equals one term of five months.

American born fathers stay than pupils whose fathers were born in Ireland?" etc., etc.

The former method is the one used in the main in Dr. Van

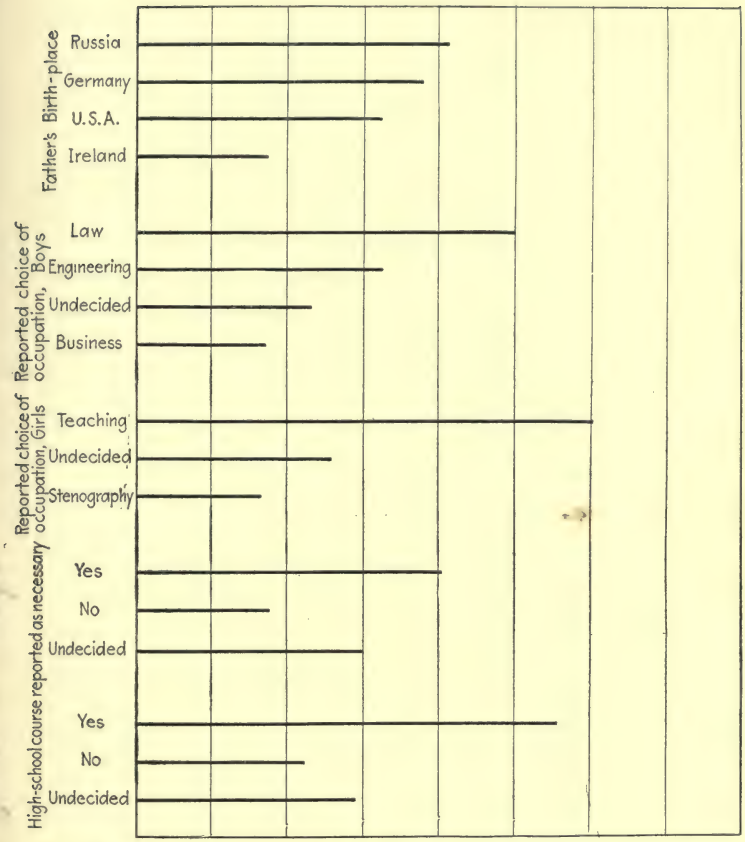


FIG. 5. Expectation of high-school life. Median lengths for children of Russian (Hebrew), American, German, or Irish born fathers; for boys reporting law, engineering, "undecided" or business as their chosen work, and for girls reporting teaching, "undecided" and stenography; and for boys and for girls (boys, above; girls, below) answering "yes," "no" and "undecided" to the question, "Are four years of high school necessary?"

Denburg's report, but data are there given which permit the latter sort of questions to be answered. So I have computed the expectation of high-school life according to whether or not cer-

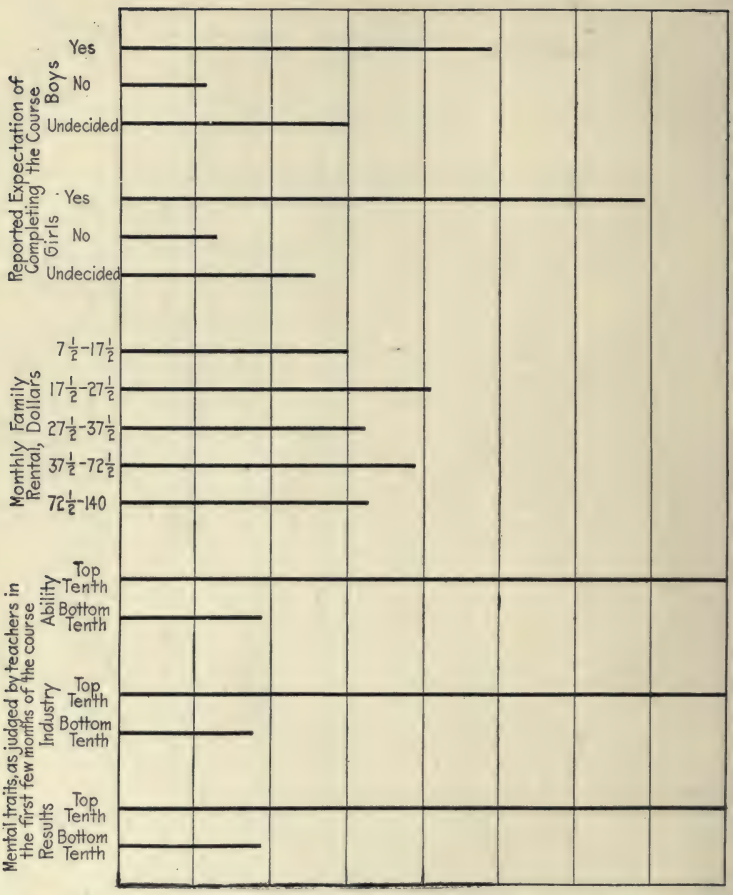


FIG. 6. Expectation of high-school life. Median lengths for boys and girls answering "yes," "no" and "undecided" to the question, "Do you intend to stay in high school four years?"; for boys and children with home rentals of $10–$20, $20–$30, $30–$40, $40–$70 and over $70 per month; and for the top and bottom approximate tenths in ability, in industry and in results as estimated by teachers.

tain causes are acting. The results are presented clearly to the eye in Figs. 4, 5, 6, and 7. In all these diagrams, one centimeter

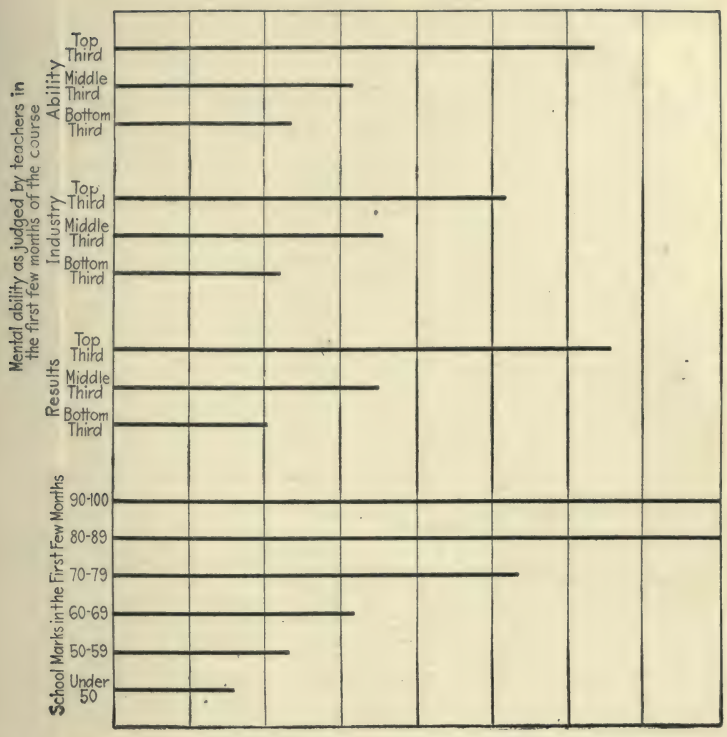


FIG. 7. Expectation of high-school life. Median lengths for the top, middle and bottom thirds in ability, industry and results as estimated by teachers, and for children whose first term's marks in scholarship were:—below 50, from 50 to 59, from 60 to 69, from 70 to 79, from 80 to 89, and from 90 to 100.

equals one term or five months. At the top and at the bottom of each page are scales eight centimeters long representing the eight terms, or four years, or forty months. Each of the lines between represents the median length of stay, in the New York public high schools, of pupils characterized by the statement at the left. Thus Fig. 4 shows that being a girl rather than a boy adds one and a third months, or eight per cent, to the expectation of high-school life; each year that a pupil is under 14 at en-

trance adds to, and each year that a pupil is over 14 at entrance takes away from, his expectation of life, pupils 12 years old at entrance staying three and a half times as long as those 17 years old, and nearly one and three-fourths times as long as those 16 years old. Those who report themselves at entrance as having had serious illness stay longer than those who do not. Habitual severe headaches make no considerable difference. Those who wear glasses stay two-thirds of a term longer than those who do not.

The diagrams tell their own story better than words. If a record such as Dr. Van Denburg got from these thousand pupils should be obtained from all the entering pupils of New York City's public schools, we could prophesy the length of each one's career as we now prophesy the temperature of a day in December, the daily horse-power to be got from a stream, or the length of a patient's illness. If we knew nothing at all of a pupil entering in February, 1906, save that he did enter, we could foretell that he had an even chance of staying three and two-fifths terms, or 17 months. Know also that his father was born in Russia, and you can add 3 months to his expectation. Know that his father was born in Ireland and you can reduce his expectation to 8.8 months, or a little over two-fifths that of the Russian Hebrew. Know that a boy reports himself as intending to be a lawyer, and you can expect him to stay nearly two and a half times as long as a boy who reports himself as intending to go into business. Know that a girl intends to be a teacher, and her expectation of high-school life is over three and a half times as long as that of a girl intending to be a stenographer, and two and a third times as long as that of a girl reporting herself as "undecided." The mere fact that a boy or girl regards a high school course as necessary for his intended work in life more than doubles his expectation. The mere fact that a pupil reports himself as expecting to complete the course gives him nearly five times as long a probable

stay as the pupil who expects not to complete it (4.4 times for boys and 5.2 times for girls).

Such educational probabilities should be used to determine both the advice and the treatment given to individuals. High school principals should, so far as time allows, get such an initial record from each pupil, should use it for the time being in the light of Dr. Van Denburg's study, and eventually, by following two or three entering classes through four years, calculate the expectation for each factor in their own communities.

The economic condition of the pupil is shown to be relatively a minor factor. The wealthiest, the poorest, and those with monthly rentals from $27.00 to $37.00 stay in school about equally long. Practically all of the common talk about the economic factor in elimination is thus shown to have been mere speculation in the case of New York high schools. Is it perhaps equally so in the reader's own community?

The boy or girl who so impresses his teachers as to be ranked in the top tenth of the entering pupils for ability will stay four and a quarter times as long as the one who is so ranked in the bottom tenth. A rating in the top third compared with one in the bottom third nearly trebles (2.7 times) the probable high school career. An average mark of 80 or more for the first few months means a stay five times as long as an average mark below 50.

These school marks and teachers' judgments of ability doubtless measure the specialized ability to do well in scholarly work, of which interest in the high school tasks is a large component, rather than absolutely general ability for all life's work. Just how close the correlation between the two is has not been determined. But it is positive. Consequently, though freely admitting that some really gifted pupils are ranked low and that some pupils whose special gifts at lesson-getting conceal their essential stupidity are ranked high, it is nevertheless certain that one cause of elimination in New York City high schools is relative lack of intellect.

§ 7. The Variation Amongst Pupils of the Same School Grade

The pupils who are grouped together for instruction in the same grade, even in those schools which are administered with more than usual sagacity, differ greatly in ability. If they are measured for ability in arithmetic, spelling, composition, or other school studies, or in such tests as a psychologist finds most significant of general intellectual efficiency, the variation is such that some pupils in the grade do four or five times as much as others in a given time, or do the same amount with a far smaller proportion of errors, or do successfully tasks which the others cannot master.

It is indeed the case that some pupils in the third grade seem superior, in fitness to receive fourth grade education, to a majority of those in the fourth grade, that some seem superior to a fair percentage of those in the fifth grade, and so on. There is reason to believe that the eight school grades, as administered in even the most progressive cities, do not even approximately divide the school population into eight groups, each one made up of pupils fit for more advanced education than those in the previous grade are fit for.

One of the most significant demonstrations of this failure of school grading to produce a series of groups—each fairly homogeneous, and, as a series, differing progressively in knowledge, power, or anything else significant of educational advancement—is given in Dr. F. G. Bonser's "Reasoning Ability of Children of the 4th, 5th, and 6th Grades." ['10]. I shall quote, with comments, the essential facts of the demonstration, which will be found also to suggest other facts of importance in the management of schools.

Dr. Bonser measured 757 boys and girls in grades 4A, 5B, 5A, 6B, and 6A (B being used for the first, or lower, half-year of a grade; and A, for the second, or higher, half), in respect to their achievements in the following tests:

Tests I and II

I. A. Get the answers to these problems as quickly as you can.

1. If ¾ of a gallon of oil costs 9 cents, what will 7 gallons cost?
2. John sold 4 sheep for $5 each. He kept ½ of the money and with the other ½ he bought lambs at $2 each. How many did he buy?
3. A pint of water weighs a pound. What does a gallon weigh?
4. At 12½ cents each, how much more will 6 tablets cost than 10 pens at 5 cents each?
5. At 15 cents a yard, how much will 7 feet of cloth cost?

I. B.

1. A man whose salary is $20 a week spends $14 a week. In how many weeks can he save $300?
2. How many pencils can you buy for 50 cents at the rate of 2 for 5 cents.
3. A man bought land for $100. He sold it for $120, gaining $5 an acre. How many acres were there?
4. A man spent $^2/_3$ of his money and had $8 left. How much had he at first?
5. The uniforms for a baseball nine cost $2.50 each. The shoes cost $2 a pair. What was the total cost of uniforms and shoes for the nine?

II. A.

1. 32 plus what number equals 36?
2. If John had 15 cents more than he spent to-day he would have 40 cents. How much did he spend to-day?
3. What number minus 7 equals 23?
4. If James had 4 times as much money as George, he would have $16. How much money has George?
5. What number added to 16 gives a number 4 less than 27?

II. B.

1. What number subtracted 12 times from 30 will leave a remainder of 6?
2. If a train travels half a mile in a minute, what is its rate per hour?
3. What number minus 16 equals 20?

4. What number doubled equals 2 times 3?
5. If 7 multiplied by some number equals 63, what is the number?

In the original blanks, immediately following each problem, space was left for its solution.

Controlled Association

For controlled association, three types of tests were used. First, two sets of ten sentences each, III, A, a and b, were given with a significant word omitted from each to be filled in by the pupil. Second, two sets of ten sentences each, III, B, a and b, were given in each of which two significant words were placed, one above the other, one giving a correct meaning to the sentence, the other an erroneous meaning, the pupil to draw a line through the wrong word leaving the sentence so that it would read correctly. Third, three sets of twenty words each, IV, A, B, and C, were given to pupils, they to write beside each respective word a word just its opposite in meaning—the familiar "opposites" test.

Tests III and IV

III. A. a. Complete the following sentences as quickly as you can by filling the blank spaces with appropriate words:

1. ———— always comes in the last week in December.
2. A ———— is one who plays a musical instrument.
3. The city ———— is in Russia.
4. ———— are large, visible bodies of watery vapor floating about in the air.
5. ———— used for building houses are made of clay.
6. The machine used on a railroad for drawing cars is an ————.
7. ———— is the most useful metal for blacksmiths.
8. ———— live and swim about in the water.
9. Most light, summer clothing is made of ———— goods.
10. ———— is a holiday.

III. A. b.

1. The flesh of cattle used for food is called ————.
2. The ———— months are June, July and August.

3. The ———— makes it light during the day.
4. ———— catch many mice and birds.
5. A ———— is a large stream of water flowing through the land.
6. Men who live in the country and till the soil are called ————.
7. ———— is a mineral which we burn.
8. The ———— Ocean is east of the United States.
9. ———— sell sugar, vegetables and other foods.
10. There are ———— hours in half a day.

III. B. a. As quickly as you can, make these sentences correct by drawing a line through the wrong word where two words occur, one above the other:

1. Days are $\frac{\text{shorter}}{\text{longer}}$ in summer than in winter.
2. Water always flows $\frac{\text{up}}{\text{down}}$ hill.
3. Glass breaks $\frac{\text{more}}{\text{less}}$ easily than tin.
4. The sun rises $\frac{\text{earlier}}{\text{later}}$ in January than in July.
5. Iron is $\frac{\text{harder}}{\text{softer}}$ than wood.
6. It is $\frac{\text{warmer}}{\text{colder}}$ in Florida than in Maine.
7. Anything that floats is $\frac{\text{heavier}}{\text{lighter}}$ than water.
8. Oranges grow $\frac{\text{more}}{\text{less}}$ satisfactorily in California than in New Jersey.
9. Shadows are $\frac{\text{shorter}}{\text{longer}}$ in summer than in winter.
10. Plants grow $\frac{\text{more}}{\text{less}}$ readily in warm sunshine than in the cool shade.

III. B. b.

1. Men are usually $\frac{\text{stronger}}{\text{weaker}}$ than women.
2. A pound of iron is worth $\frac{\text{less}}{\text{more}}$ than a pound of copper.

3. Christmas comes before / after Thanksgiving day.

4. Cotton clothing is warmer / cooler than wool.

5. Less / More coal is used in summer than in winter.

6. Bankers are poorer / richer than cab drivers.

7. More / Fewer horses than mules are used for driving purposes.

8. There are more / fewer teachers than preachers.

9. Oranges are more / less sweet than lemons.

10. More / Less bread than cake is eaten in this city.

IV. As quickly as you can, write beside each of these words a word that means exactly its opposite:

A.	B.	C.
day	great	bad
asleep	hot	inside
absent	dirty	slow
brother	heavy	short
best	late	little
above	first	soft
big	left	black
backwards	morning	dark
buy	much	sad
come	near	true
cheap	north	dislike
broad	open	poor
dead	round	well
land	sharp	sorry
country	east	thick
tall	known	full
son	something	peace
here	stay	few
less	push	below
mine	nowhere	enemy

Selective Judgment

Two types of tests were used for selective judgment. First, two sets, V, A and B, of two series each of ten reasons why some given fact is true, some of which reasons are correct, the others incorrect or irrelevant, were given. The pupil was to select, by checking, the correct reasons. Second, there were given similarly two sets, VI, A and B. of three series each, of five definitions for a given thing or term, some of which were correct, the others incorrect or irrelevant.

Tests V and VI

V. A. The following reasons have been given to show why New York has become a larger city than Boston. As quickly as you can, place a cross like this, +, before each reason you think a good one:

1. New York is on an island.
2. More foreigners live in New York than in Boston.
3. New York is on a large river coming from a rich agricultural region.
4. Mr. Rockefeller has a fine home in New York.
5. New York has more churches than Boston.
6. New York has better communication with the States lying to the west.
7. New York has elevated railroads.
8. New York is in the midst of a rich fruit and agricultural district.
9. New York is nine or ten years older than Boston.
10. New York has a republican governor.

V. B. These reasons have been given to show that oak wood is better than pine for making furniture. Check the good reasons.

1. Oak wood is harder than pine.
2. Oak trees have acorns, pine trees do not.
3. Oak wood takes a finer polish than pine.
4. Oak trees have more beautiful leaves.
5. Oak trees make good homes for squirrels.
6. Pine wood will not last so long as oak.

7. Pine is more easily dented and defaced than oak.
8. When polished and varnished, oak is much more beautiful than pine.
9. Pine trees are sometimes used for Christmas trees.
10. Oak trees are easier to climb than pine trees.

V. C. The following reasons have been given to show why oranges grow better in Florida than in New Jersey. Check the good reasons.

1. There are many negroes in Florida who work very cheaply.
2. Florida has warm summer weather almost the whole year.
3. There are no alligators in New Jersey.
4. Florida very rarely has hard frosts.
5. New Jersey is not so large as Florida.
6. Florida was settled earlier than New Jersey.
7. New Jersey grows many fine peaches.
8. Florida has a very moist, warm climate.
9. Florida is a word meaning the land of flowers.
10. Florida is a popular winter resort.

V. D. Among these reasons why horses are better than cattle for driving and working animals, check those which you think are good reasons.

1. Horses are more intelligent than cattle.
2. Cattle are not so tall as horses.
3. Horses like corn, oats and hay.
4. Horses are much more active and walk faster than cattle.
5. Cattle are extensively used for food.
6. Horses are much more beautiful and graceful than cattle.
7. The skins of horses are sometimes made into gloves.
8. Horses are more easily trained and controlled than cattle.
9. President Roosevelt likes to ride on horseback.
10. Horses have more rapid and varied gaits than cattle.

VI. A. In the following definitions, place a small cross, like this,+, before those which you think are good ones, doing it as quickly as you can.

a. Definitions of a *shoe.*

1. A portion of clothing.
2. Something black made of leather.
3. A protective covering for the feet, usually made of leather, having a firm bottom or sole and flexible upper portions, an opening for the foot being fastened by lacings, buttons or buckles.
4. Something to wear on the feet.
5. A necessary article costing from one to five or six dollars.

b. Definitions of an *island.*

1. A piece of land out in the water.
2. A small body of land.
3. A body of land entirely surrounded by water.
4. Cuba is an island.
5. A portion of land rising above the surrounding level.

c. Definitions of *to explode.*

1. To burst suddenly with a loud noise.
2. To knock all to pieces.
3. To make a very loud noise.
4. To fill the air with a tumultuous roar.
5. To blow up.

a. Definitions of a *chair.*

1. A piece of household furniture.
2. A movable seat with a back intended for one person.
3. A piece of furniture on which to sit.
4. Rocking chairs are comfortable chairs.
5. A single seat having a back.

b. Definitions of *to write.*

1. To make marks with a pen or pencil.
2. To make characters which stand for ideas.
3. To use a pen or pencil.
4. To make marks on any kind of surface with any kind of an instrument which will express one's ideas so that another may understand them.
5. To write a letter.

c. Definitions of a *buggy.*

1. A buggy is black.
2. A buggy is something to ride in.
3. A buggy is a light, four wheeled vehicle, with or without a top or covering, designed for carrying two or three persons.
4. A buggy is drawn by horses.
5. A buggy may have rubber tires.

Literary Interpretation

For literary interpretation, two stanzas of poetry, VII, A and B, were used, the pupil to write the meaning of each in his own words. These poems are taken from a third reader and a second reader respectively, each from a different standard series published within a decade of the time of these tests.

Test VII

VII. A. Read carefully the following stanza, then write its meaning in your own words.

"This little rill, that from the springs
Of yonder grove its current brings,
Plays on the slope awhile, and then
Goes prattling into groves again,
Oft to its warbling waters drew
My little feet, when life was new."

B. Read carefully the following stanza, then write its meaning in your own words:

"Under the greenwood tree,
Who loves to lie with me,
And tune his merry note
Unto the sweet bird's throat,
Come hither, come hither, come hither;
Here shall he see
No enemy
But winter and rough weather."

[*Bonser*, '10, pp. 3–8]

Of the method of giving these tests, Dr. Bonser writes: "All of the tests were given by the writer or under his direct supervision . . . . The greatest care was used to preserve the most strict uniformity in making tests and it is believed that a high degree of success was attained in this.

"Pupils were given the printed papers containing the questions, one test at a time, face downward, upon their desks. Space was provided upon the papers for all answers. Pupils had been directed to get pencils ready for writing before papers were distributed. When all had received copies of the test, the children were told to turn the papers over and to write their names and ages at their last birthday at the top of the pages, but to make no other marks upon them until a signal to begin was given. The printed directions at the top of the papers were read aloud to the pupils and the signal to begin was at once given unless experience had indicated a need for some additional word of explanation which was given before the signal to begin. . . . When the first pupil to finish had completed his work, in all of the tests but that of IV, the opposites, all turned the papers over, face downward, and they were collected. For the opposites, two minutes were given for each test." [Bonser, '10, pp. 9–10.]

The test occupied two days separated by an interval.

Scoring

"*Tests I and II.* For each problem in arithmetic, a grade of 2 was given for each correct solution. If a two-step problem, and one part was right, the other not, the grade given was 1. No detraction was made for inaccuracies in operations.

"*Test III.* In the filling of blanks, and the choice of words, a grade of 1 was given for each correct answer, 0 for each wrong.

"*Test IV.* For the opposites, 2 was given for the correct word, 1 when it was partly right in meaning, and 0 for wrong and omitted words.

"*Tests V and VI.* For choice of reasons and definitions, the scale used was as follows, the grade in each case being the algebraic sum:

V. A. Numbers 3, 6, and 8, each 3 points; 1, 2, 5, 7, and 9, each −1; 4 and 10, each −2.
B. 1, 3, 6, 7, and 8, each 2; 2, 4, 5, 9, and 10, each −2.
C. 2, 4, and 8, each 3; 1, 3, 7, 9, and 10, each −1; 5 and 6 each −2.
D. 1, 4, 6, 8, and 10, each 2; 2, 3, 5, 7, and 9, each −2.

VI. A. a. Number 3, 7 points; 4, 2; 1, −2; 2, −3; 5, −4.
b. 1, 2 points; 3, 5; 4, 1; 2 and 5, each −4.
c. 1, 6 points; 5, 3; 2, 3, and 4, each −3.
B. a. 2, 5 points; 3, 1; 5, 2; 1, and 4, each −4.
b. 2, 2 points; 4, 5; 5, 1; 1, and 3, each −4.
c. 2, 2 points; 3, 7; 1, 4, and 5, each −3.

"*Test VII.* From 0 to 10 on basis of estimated merit for each part.

"*Test VIII.* Spelling. Subtract 1 for each misspelled word from the arbitrary standard of 15 for each of the two sets of papers used." [Bonser, '10, pp. 16, 17.]

When each individual is thus scored for each test, and all his scores are added together, the different grades overlap enormously as shown in Table 12.

It should be borne in mind, however, that (except with the "opposite" test) the time allowed in each grade was not necessarily identical, each class being given such time as the quickest person in it required to complete the test. Dr. Bonser does not regard the time factor as of much consequence, in view of the nature of the tests, but it seems probable that the lower grades had longer time and so are credited with somewhat better relative scores than they would have obtained if all grades had been given in every test some constant time.

TABLE 12

THE FREQUENCY OF EACH DEGREE OF ABILITY IN REASONING IN THE CASE OF EACH GRADE

ABILITY	NUMBER OF INDIVIDUALS				
	Grade 4A	Grade 5B	Grade 5A	Grade 6B	Grade 6A
20– 29	3				
30– 39	7	1			
40– 49	6				
50– 59	3	2	3		
60– 69	8	1	2		
70– 79	8	3	3	2	
80– 89	10	3			1
90– 99	15	3	7	1	1
100–109	15	4	5		
110–119	12	17	5	5	2
120–129	12	14	9	3	1
130–139	20	21	7	8	
140–149	20	11	8	9	3
150–159	12	18	10	12	5
160–169	8	14	13	17	5
170–179	6	12	13	16	11
180–189	4	12	8	21	10
190–199	3	12	11	19	8
200–209	3	5	9	19	11
210–219	2	7	5	16	13
220–229	1	2	2	9	13
230–239	2	2	1	9	14
240–249	1			7	6
250–259		1		5	5
260–269			2	1	
All degrees of ability	181	165	123	179	109

Subject to this possible correction Table 12 reveals such facts as these:

171 or 94% of the 4A pupils are above the worst pupils of the 5B grade
162 or 90% " " " " " " 5A "
150 or 83% " " " " " " 6B "
143 or 79% " " " " " " 6A "

41 or 23% of the 4A pupils are above the mid-pupil of the 5B grade
27 or 15% " " " " " 5A "
13 or 7% " " " " " 6B "
9 or 5% " " " " " 6A "

The best of the 4A pupils makes a score three times as high as the worst pupils of the 6A.

90% of the 6A pupils are below the best pupil of the 4A grade
4% " " " mid-pupil " "

The difference of one half grade from the next (*i. e.* 4A from 5B, 5B from 5A, 5A from 6B, and 6B from 6A) is, on the average, only one-tenth of the difference between the lowest and the highest pupil in any one grade. It we take the highest 109 of the 757 pupils, only 46 of them will be in the highest of the five half grades; 6 of them will be in the lowest of the five, 9 will be in the next to lowest.

That is, the result of the actual school grading is to pick the most able for the highest grade hardly four times in ten, and to put one out of twenty of the most able in a grade two years below the highest of the five. If we take the 123 who, for ability, should be in the middle or 5A half grade, we find only a fourth of them there.

If we drew at random 109 boys and girls from the 757 in all these grades to make up the 6A, *this absolutely random drawing* would differ from the 4A grade by half as much as does the group picked out administratively as two years in advance of it.

Great variability within one school grade and overlapping by it of the grades on either side has been found in every careful test of the abilities of school children. Indeed I unhesitatingly assert that a month's test in respect to the ability to do the specific intellectual work of the school course of study would show a similar, though perhaps not so great, variability and a similar overlapping. If, that is, all the 757 pupils should be tested for six months with 6A work, there would be many of the 4A pupils who would outdo many of the 6A pupils. So also, if all of the group were set at 4A or 5B work, many of the 6A pupils would be

inferior to many of the 4A pupils. For any intellectual task or combination of tasks, whether a psychologist's tests, a common-sense problem, or a series of school tests in history, arithmetic, spelling or what not, the groups got by the school's promotion system will be found to overlap each other enormously. When the task is one of amount of knowledge the overlapping will be less than here where power to use knowledge counts largely, but it will still exist, and in a degree that will surprise conventional believers in the sanctity of school grades as measures of scholarly achievement. The conventional opinions of school officers and teachers overweight the importance of the instruction given grade by grade. They promote unfit children because they fancy that these children, having had once, twice or three times over the supposedly valuable instruction of a given grade, must be fit for the next. They refuse to permit gifted children to skip grades because they fancy that the loss of any fraction of this supposedly valuable instruction must cause some grave injury or risk. Even the most sagacious are not wholly free from this superstitious taboo on rational judgment of children's ability by what they can actually do. So school gradation and promotion are far from being measures of intellectual merit pure and undefiled.

It is not here claimed that gradation and promotion should be for intellectual merit alone. Physiological maturity, childishness of interests, faithful effort, and many other criteria are more or less defensible. The gifted pupil may be the gainer by working half as hard or doing the work twice as well, rather than progressing twice as fast. The pupil stupid at the tasks of the course of study may be better off in failing at sixth grade work than in succeeding in third grade work. The point is that gradation and promotion should not *pretend to be* for intellectual merit when they are not, and should be efficiently managed consequences of *some* rational principles, not of an inheritance of superstitious

prejudices bequeathed by a generation that knew nothing of the individual differences that characterize the human species.

Lest any reader fancy that the great individual differences found within the same grades were due to age or maturity, I assure him that this is far from the case. Ages will be found to overlap as do grades, and even more.

§ 8. The Social and Economic Status of Pupils

This country's great contribution to educational practice is the public high school, providing boys and girls from thirteen to nineteen with free education and free preparation for professional schools, technical schools and colleges.

That a fifth to a third of all children go to high school for at least a time is a sign of the economic prosperity of the country which permits so many children to be freed from productive labor for so long. But it is also found upon investigation to be a sign of strong intellectual interests in very many boys and girls who partially or entirely support themselves while continuing their studies, and to be a sign of a family devotion in working and enduring to enable a child or younger brother to stay in school, which is one of the noblest qualities in American life to-day.

Teachers should not complain of the lack of "culture" and insufficient devotion to lesson-getting on the part of a high school pupil until they have learned the limitations of the social environment from which he comes and the conditions under which he has to work. Let the reader consider the repeated drama of struggle and sacrifice implied in the facts as to father's occupation and family expense for rental in the case of a random picking of a thousand boys and girls who entered New York City high schools in February, 1906.

There are, amongst these fathers, as many compositors as there are doctors, lawyers, clergymen and teachers combined. There are nearly twice as many "tailors"—that is, workers on garments. There are as many waiters as there are architects; as many barbers as there are civil and electrical engineers; as many janitors as there are dentists and editors together.

The policemen, carpenters, masons, plumbers, metal workers, painters, compositors and firemen outnumber the doctors, lawyers, clergymen and teachers five to one. Coachmen, street cleaners, elevator men, Turkish-bath attendants, watchmen and laundry workers send sons to the high school. Coachmen, elevator men and watchmen send as many as clergymen and teachers.[1]

Of the economic condition of the families as shown by the rent paid, Dr. Van Denburg writes:

"Our study of the rents paid by the parents of the high school pupils, incomplete as it is, yet furnishes some of the most surprising information which the whole investigation has yielded. Only 420 homes were visited out of a thousand so marked for investigation. Lack of time and money combined to prevent a complete canvass.

"The method followed in the majority of cases was to visit the house, explain that the investigator was making a study of rents and ask the actual rents paid by the tenant. In most cases the janitor gave the information willingly. In only a few cases was it necessary to pose as a prospective tenant or to visit the renting agent. If any errors resulted from this method it will probably be that in some cases the figures are too high as the 'rent asked' as it is known in New York often exceeds the 'rent paid' by actual lessees.

"In our selection of homes to be visited certain localities were selected such as, in Manhattan the middle and upper West Side, the lower East Side, Harlem, the lower West Side. In Brooklyn, Williamsburg, Flatbush, and the Park Slope, were selected. Home addresses were tabulated by localities and wherever a large number of addresses were found to come within an area of ten blocks or so square the rents were looked up.

[1] For a full account of the occupations of fathers and also of older brothers and sisters see the tables on pages 39 to 48 of *Causes of Elimination of Students in the Public Secondary Schools of New York City*, by J. K. Van Denburg, 1911.

"It was practically impossible to visit scattered homes in the Bronx, Coney Island section, or Staten Island or in sections where a half day's work would even at the expense of many car-fares give less than a dozen rentals as the result.

"The rents were originally recorded in two different numbers, the lowest and the highest asked in the tenement, flat or apartment house. These two figures were then averaged and the rent recorded in our tables according to the multiple of five, which it most nearly approached. For example; rents from $10 to $18 would average $14, and appear in our tables as $15. Rents $14 to $20 would average $17 and also be recorded as $15. Thus it will be seen that extreme accuracy is not pretended but merely a trustworthy approximation of the money paid each month by the families under observation.

"Rent as an indication of a family's financial condition must also take into consideration several points we did not have time to consider. For example, a family of three paying twenty dollars a month for three rooms may represent an entirely different financial condition from that which is shown by a family of six paying twenty dollars for three rooms. It is not only the rent itself, but the number of rooms and the number in the family that must be considered.

"Any scientifically accurate study of rents as an indication of a family's financial responsibility must include among other things:

1. Rent actually paid.
2. Number of rooms.
3. Number of self-supporting (rent-paying grown children living at home).
4. Number of children in school.
5. Number of 'roomers' who sublet rooms or beds.

"However, with all these data omitted, we can still trust our figures as maximum rentals very confidently, because all the

five items mentioned above except No. 4 tend to lower the net rent and to enable a family to live in a tenement or flat where *more* rent is charged than the same family would be able to afford on the basis of the father's wages alone.

"Our figures, especially those recorded as below twenty dollars may then be considered as erring only on the side of being too high, rarely if ever too low. For our purposes they may be accepted as fairly accurate *maximum* figures rather than true averages for the homes visited." ['11, pp. 79f.]

The essential facts found by Dr. Van Denburg appear in Table 13, which shows at a glance the sort of homes from which the city's high-school pupils come. In reading the table it should be borne in mind that, roughly, a fifteen-dollar rental means an unheated and badly ventilated space, ten feet by forty—that is, practically the lowest grade three or four-room tenement in the cheapest quarters of Manhattan or Brooklyn. A twenty-five-dollar rental means in Manhattan a space little or no larger, but not so dark, dirty, or lacking in toilet conveniences. In some parts of the outlying boroughs a twenty-five-dollar rental means half of a ten or twelve-room house or a tenement twelve feet by fifty.

Such homes are the best the parents can provide for three-quarters of these pupils. In them there will, of course, be no separate room for the high-school pupil to study or sleep in. No money can well be spent for books. There is always work, especially for the girls, in getting meals, "minding" younger children, and other household duties, for a servant is unknown in these homes. The bare facts of Table 13 tell to one who will reflect on their meaning a poignant story of appreciation and sacrifice.

TABLE 13

THE RELATIVE FREQUENCIES OF FAMILIES PAYING VARIOUS AMOUNTS FOR RENT, IN THE CASE OF FAMILIES SENDING CHILDREN TO NEW YORK PUBLIC HIGH SCHOOLS

QUANTITY Approximate Monthly Rental in Dollars	FREQUENCY Numbers of Families per Thousand
10	79
15	367
20	81
25	181
30	38
35	79
40	12
45	52
50	7
55	14
60	12
65	10
70	
75	5
80	2
85	7
90	12
95	
100 105	19
110 115	12
120 125	5
130	
135	
140 145	5
150	2

BY COARSER GROUPING

Rental	Per Cent of Families
$10–$ 25	71
$30–$ 45	18
$50–$ 65	4
$70–$ 85	2
$90–$105	3
$110 and over.	2

PART II

STUDIES OF THE TEACHING STAFF

§ 9. The Causes and Conditions of Efficiency in Teaching

The first student of education to measure the conditions of efficiency in teaching, so far as the writer knows, was Dr. J. L. Meriam, whose monograph on *Normal School Education and Efficiency in Teaching* ['05] includes reports on the relation of efficiency in teaching to: (1) scholarship during the normal school course, (2) rank in practice teaching during that course, and (3) length of experience. The facts for (1) and (2) almost exclusively, and for (3) exclusively, concern teachers in elementary schools. I give first the facts for (1) and (2).

Since the teachers were widely scattered and comprise the graduates (of '98–'02 inclusive) from five normal schools, usable ratings for efficiency could not be obtained from their principals, superintendents and fellow teachers.

"Another method was taken. Principals of normal schools usually follow quite closely the work of their graduates.

"The estimate of such men is probably the best available mark for teaching efficiency. This is the mark used in this study.

"In selecting the individuals, the roll of classes graduating between 1898 and 1902, inclusive, was taken. The individuals were taken in order, in so far as the principal of the school had followed the work of the graduate sufficiently to be ready to estimate the efficiency of the teaching. All others were discarded." [Meriam, '05, p. 59.]

The marks for scholarship and for practice teaching were both taken from the school records. These measures are all, as Dr. Meriam points out, subject to errors of opinion, but it is best to note first what they show when so treated as to add no new errors, and to discuss later whatever modifications or insecurities need comment.

Taking these marks as true measures, the following coefficients of correlation [1] were found:

Efficiency	in	teaching	with	practice teaching	.39
"	"	"	"	psychology	.37
"	"	"	"	history and principles of education	.28
"	"	"	"	methods of teaching math., sci., hist., and English	.29
"	"	"	"	academic courses in math., sci., hist., and English	.22

The gross amounts of these correlations may all be too low or, though this is unlikely, all too high, but their mutual relations will not be greatly altered. The main source of error is, of course, the reliance upon the opinions of the principals of the normal schools as to the efficiency of these teachers. This source of error operates in two ways. First, in so far as a principal simply *blunders*, through ignorance, carelessness, or a random collection of prejudices, the effect is *to make all the obtained correlations lower than they would be with perfectly just ratings*. Second, in so far as the principal is biased in his judgment of individuals' teaching efficiency by the impression he got from their scholarly work, or work in practice teaching, when they were students, the obtained correlation in question will be *higher* than it would be with perfectly just ratings.

Another source of error is that the marks, especially when given on a coarse scale (such as A, B, C, D, E, F, or 1, 2, 3, 4, 5; or *excellent*, *good*, etc.) and for a single course, do not perfectly measure scholarship or the real ability shown in the student's

[1] These coefficients of correlation are numbers, measuring the closeness of correspondence between a teacher's rank amongst his fellows in one of the traits listed and, his rank in the other trait listed. +1.00 means *perfect correspondence*—that each individual occupies exactly the same relative position in the two traits; — 1.00 means that the positions are exactly reversed, the highest individual in the one trait being the lowest in the other; 0 means a haphazard, random relation between the two, so that the best person in the one trait is as likely to be worst as best in the other. For a fuller account see the chapters on the measurement of relations in Thorndike's *Mental and Social Measurements*.

practice teaching. The effect of this is to make all the obtained correlations *lower* than they would be if normal school marks each and all represented omniscient justice.

The effect of random inaccuracies in the original measures upon correlations computed from them was not known at the time when Dr. Meriam did his work, so that means to calculate the necessary allowances were not taken by him. It is however probable that with perfectly just measures of all the traits the correlations would be:

Efficiency in teaching with	practice teaching	between .35 and .60
" " " "	psychology	" .35 " .60
" " " "	history and principles of education	" .25 " .50
" " " "	methods of teaching math., sci., hist., and English	" .25 " .50
" " " "	academic courses in math., sci., hist., and English	" .25 " .50

In any case it is clear that scholarship is one contributor to efficiency in teaching and that it is somewhere nearly as good a sign of it as ability in practice teaching is.

The Relation of Efficiency in Teaching to Length of Experience

Five hundred and seven teachers in certain elementary schools in New York and Massachusetts, the length of whose teaching experience was known, were graded for efficiency in teaching, each group by the principal of the school.

" The ranking of the teachers of the 33 schools differed much in the number of groups into which the corps of teachers was divided. For example, one principal divided his teachers into a first, second and third rank. Others made 5, 8, 12 and even 22 groups. In this last group were 22 teachers, who were thus arranged in perfect serial order from the most efficient teacher to the least efficient teacher." . . .

To use all these together conveniently they were regrouped into five grades by the method shown below, in Table 14.

"Here the principle used was that the extremes should be disturbed as little as possible. Thus, in an original grouping into 10 we now have: first rank remains first rank; second and third become second rank; the fourth to the seventh become third rank; eighth and ninth become fourth rank; and the tenth become fifth rank." [Meriam, '05, p. 106]

TABLE 14

TABLE OF REGROUPING

Original groups	First rank	Second rank	Third rank	Fourth rank	Fifth rank
5	1	2	3	4	5
6	1	2	3–4	5	6
7	1	2	3–5	6	7
8	1	2	3–6	7	8
9	1	2–3	4–6	7–8	9
10	1	2–3	4–7	8–9	10
11	1	2–3	4–8	9–10	11
12	1	2–4	5–8	9–11	12
13	1	2–4	5–9	10–12	13
14	1	2–4	5–10	11–13	14
15	1	2–5	6–10	11–14	15
18	1	2–6	7–12	13–17	18
19	1	2–6	7–13	14–18	19
20	1	2–6	7–14	15–19	20
22	1–2	3–7	8–15	16–20	21–22

"What do our data indicate as to the relation of experience to relative standing in teaching efficiency? We have such questions as these: Does the teacher's standing increase with her experience, *i. e.* do the older teachers stand foremost, or is there a certain amount of experience at which a teacher is in her 'prime of life?'

"In this study I have divided the thirty-three schools into two divisions: In the first division I have rearranged into five groups all schools already in five or more groups; in the other I have arranged into three groups those schools already in three or four

groups. In the former group are 387 cases; in the later, 117 cases —making 504 cases considered. The number of years' experience in teaching is given in nine groups, as follows: 0, 1, 2, 3, 4, 5, 6 to 10, 11 to 15, 16 and over. The following table [Table 15] gives the distribution. The numbers at the top give the number of years' experience; those at the left indicate the rank of the teachers; the others show the individual cases in each.

TABLE 15

TEACHING EFFICIENCY IN RELATION TO EXPERIENCE

	AMOUNT OF EXPERIENCE									
Rank	16+	15 to 11	10 to 6	5	4	3	2	1	0	Totals
1	9	16	18	2	2	1	2			50
2	16	16	28	10	6	4	7	4		91
3	16	14	51	10	12	13	10	12	1	139
4	14	15	18	6	3	6	5	10		77
5	5	7	10		1	2	1	4		30
Total	60	68	125	28	24	26	25	30	1	387

" When turned into percentages the entries in the above table give the following (Table 16):

TABLE 16

AMOUNT OF EXPERIENCE

Rank	16+	15 to 11	10 to 6	5	4	3	2	1	0	Totals
1	15.	23.6	14.4	7.	8.3	3.8	8.			13.
2	26.7	23.6	22.4	35.8	25.	15.4	28.	13.3		23.5
3	26.7	20.6	40.8	35.8	50.	50.	40.	40.	100.	36.
4	23.3	22.	14.4	21.4	12.5	23.1	20.	33.3		20.
5	8.3	10.2	8.		4.2	7.7	4.	13.3		7.5

" That is, 15 per cent of those who taught sixteen years or more are in the first rank; 13.3 per cent of those with one year's experience are in the lowest rank.

" The true standing in each group may be well seen from the median of each group; that is, the point which marks the dividing line between the better half and the poorer half in each group of teachers. These medians are calculated upon the series of five

groups according to teaching efficiency. I omit the single case with 0 years' experience.

16+	11 to 15	6 to 10	5	4	3	2	1	Totals
2.81	2.63	2.82	2.70	2.83	3.11	2.85	3.40	2.88

" A treatment of the other 117 cases in three groups gives practically the same results. The following (Table 17) is the table of distribution:

TABLE 17

AMOUNT OF EXPERIENCE

Rank	16+	11 to 15	6 to 10	5	4	3	2	1	0	Totals
1	8	9	11	4	3	2	1			38
2	6	10	19	2	2	4	2	4	5	54
3	3	3	9		1	1	1	6	1	25
Totals	17	22	39	6	6	7	4	10	6	117

The medians on the basis of a series of three are as follows:

Experience	16+	11 to 15	6 to 10	5	4	3	2	1	0	Totals
Median rank	1.58	1.70	1.95	1.25	1.50	1.87	.2	2.66	2.10	1.88

" The Pearson formula for the index of correlation for the 387 cases with the better grading gives .097. This would be much smaller but for the group with one year of experience. Apart from that group there is practically a zero correlation. It must be said, then, in answer to the relation between experience and teaching efficiency that beyond the first year of experience it is practically *nil*. After the first year the amount of experience is not an important criterion for efficient teaching in the elementary schools. The importance of this fact, if it is confirmed by later researches, to administrators of school systems is obvious." [Meriam, '05, pp. 108–111, *passim*]

The relation of efficiency in teaching to length of experience in the case of high-school teachers was studied by Thorndike ['09]

using the salaries received by teachers in private schools in the same city under free competition as measures of their efficiency.

The private schools of a single community presumably give salaries in a fairly close proportion to what they judge to be efficiency in teaching—that is, approximately free competition obtains and the salary is to some extent a measure of the teacher's efficiency. The closeness of the approximations will depend upon the extent to which the authorities of these schools are governed by economic rather than sentimental or idealistic considerations in adjusting salaries and upon the extent to which their judgments of the efficiency of teachers are correct.

The differences in salary among teachers of the same sex in private secondary schools of the same community may then be taken as to some degree parallel to the differences in their teaching efficiency; and in so far as any two communities are alike in the cost of living and the attractiveness of life and in so far as there is competition between them for the services of teachers, the two may be treated as one for the purposes of this inquiry.

The data available are rather meager, and to utilize what there are fully would require an enormous expenditure of time. I have therefore studied the relation of salary to length of experience amongst teachers in private secondary schools in only the following five cases:

Men's salaries: Private secondary schools for boys in New York City.

Men's salaries: Private secondary schools for boys in Boston, Worcester, and Philadelphia.

Women's salaries: Private secondary schools for girls in New York City.

Women's salaries: Private secondary schools for girls in Boston and Cincinnati.

Men's salaries: Private secondary schools for boys or boys and girls in towns of Massachusetts and Connecticut.[1]

Making the comparisons separately for each of these groups and then measuring the general tendency of the fact in the five

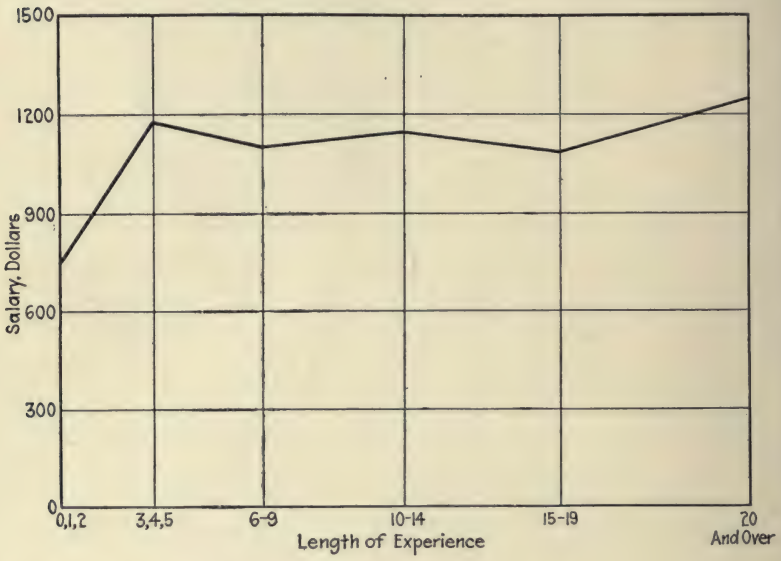


FIG. 8. The relation of salary to length of experience in the case of teachers in private secondary schools in communities alike in the value of the dollar (to a teacher.) The horizontal line gives the scale for length of experience in years. The vertical scale is for the amount of annual salary.

cases, we have the result shown in Figure 8, which relates the amount of salary to the amount of experience in teaching. So far as the data go, they support the hypothesis that the full effect of experience in teaching on efficiency in the work of a private

[1] In this case the towns are not alike in the cost of living, but as a rule the greater attractiveness of life in the more expensive towns is sufficient to make an approximate balance.

secondary school is reached in three years, the slight rise from twenty on being probably attributable to the higher wages for executive work as head of a department, or to the sentiment which leads private school authorities to maintain or increase salaries after long service, even though a more efficient person could be obtained for a less amount.

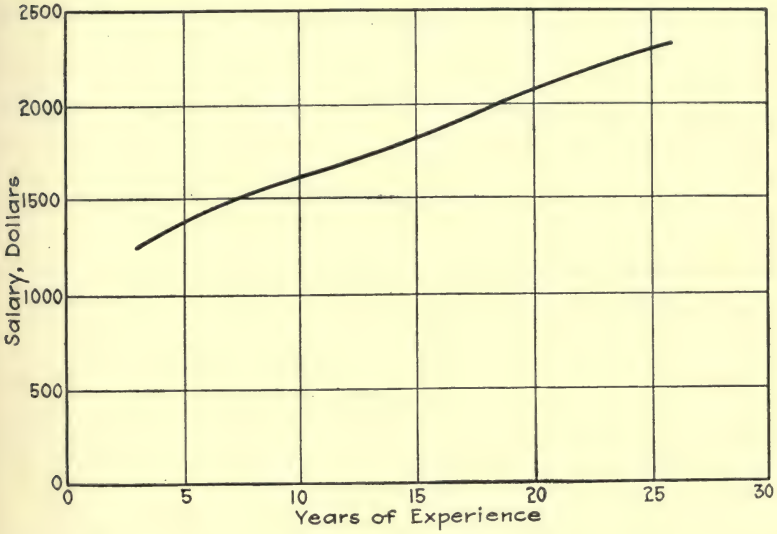


FIG. 9. The relation of salary to length of experience in the case of teachers in public high schools. Men teachers of New York, Boston, St. Louis and Chicago.

Unfortunately the private schools rarely sent the individualized data requisite for such a study, so that the measurement above made might undergo modifications of fairly large extent upon receipt of full information.

Such facts as appear in Figure 8 are in sharp contrast to those within the public system of a large city. In the latter it is customary to advance the salaries of those whose appointments are renewed, and also, though less often, to determine the amount

of the salary of a teacher entering the system from another city partly on the basis of the length of time he has taught. New York City is a notable case.

I show in Figure 9 the relation of salary to experience obtained by combining the four relations found in New York, Boston, St. Louis and Cleveland in the case of men teachers in public high schools. Figure 10 gives the same relation in the case of women teachers. The difference between the relation in these cases and what it is under free competition is obvious.

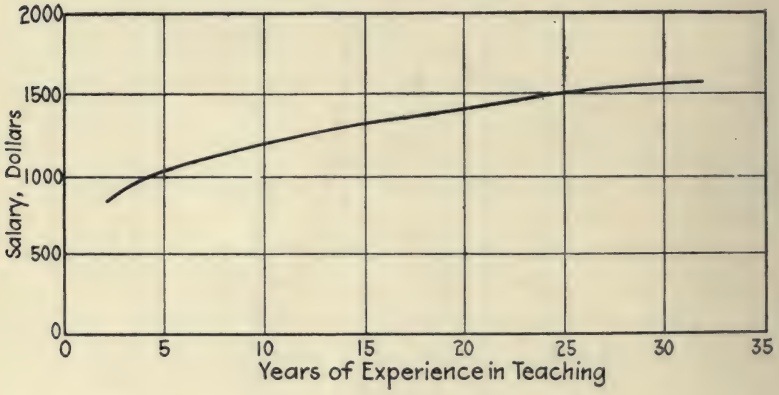


FIG. 10. The relation of salary to length of experience in the case of teachers in public high schools. Women teachers of Boston, St. Louis and Cleveland.

It may be well to warn ourselves that even if it were true that experience after the first four or five years does not greatly add to the efficiency of a public high school teacher, still it cannot be said that the customary practice in our large cities wastes money in paying for a false symptom of efficiency; for, even if the teachers of five years' experience equaled those of ten, it might still be wise to pay the latter more. In the first place, the salary schedule as a whole decides the teacher in his choice amongst positions. It is not a fixed $1,000 that he accepts, but $1,000

plus $100 advance annually up to $2,000. The advance with time is really a feature in the bargain. In the second place, it may be wise for a city to pay its teachers what will maintain a certain standard of living, rather than what will just purchase the required efficiency; and on this principle the head of a family, at least, should be advanced with age or with some other still more accurate measure of the size of his family. In the third place, the premium on experience has the administrative advantage of encouraging the adoption of teaching as a permanent profession and of preventing frequent changes in the local teaching staff. It is also free from the difficulties of competition for promotion on the grounds of pure merit.

It is well, on the other hand, to note that the premium paid for experience may deprive a city of the best services obtainable for the price it has to pay, may retain the less competent too surely, and may discourage the entrance to and continuance in the profession of that very desirable class who would prefer to work under a system of competitive promotion by merit.

The Relations of Length of Experience and of Length of Education to Amount of Salary

If one does not seek to restrict the localities used in the comparison to those in which the same salary is equally desirable, the number of cases may of course be greatly increased, to such an extent, in fact, that the relation of salary to length of experience may be studied separately for teachers of each different amount of education. The relation of salary to the amount of education for teachers of each amount of experience may also be determined.

I have so studied all the individualized reports from the public high schools of Ohio, Illinois and Wisconsin. It must be borne in mind that the large schools rarely sent in individualized reports and so are rarely included in these data. This is, of course,

an advantage in that it makes the data less diverse with respect to the cost of living and the value of life.

The computations start with preliminary tables like the following (Table 18):

TABLE 18

TABLE OF FREQUENCIES OF SALARIES OF TEACHERS OF 8 YEARS EDUCATION AND 0, 1, OR 2 YEARS OF EXPERIENCE IN TEACHING (WOMEN IN OHIO)

Quantity (Annual Salary)	Frequency (Number of Teachers)	Quantity (Annual Salary)	Frequency (Number of Teachers)	Quantity (Annual Salary)	Frequency (Number of Teachers)
$399	4	$550	1	$695	1
405	2	560	1	700	1
450	11	570	1	720	2
465	1	585	1	750	1
475	2	590	1	780	2
485	1	600	5	800	5
495	4	630	3	1,000	1
500	4	650	1		
540	8	675	2		

There are 528 such tables, but with some blanks (3 States x 2 sexes x 11 lengths of education x 8 lengths of experience, namely: 0–2, 3–5, 6–9, 10–14, 15–19, 20–24, 25–29, 30 and over). I shall refer to these 528 tables as the original tables.

From a thorough study of these tables it is clear that the relations to be investigated are substantially the same in the three States. I therefore combine the data from the three States.

A study of the same tables also shows that there is no sure appreciable difference as regards frequency of salaries for teachers of 0, 1, 2, and 3 years of education beyond the elementary schools. I therefore combine the data for these four groups. The data for ten years of education are too few to give reliable determinations. Hence I omit them.

The data for the groups of "25–29" and "30 and over" years

of experience are too few to give reliable determinations, and there is surely no great difference between these two groups. So I combine these also.

The 98 tables resulting furnish the material for answering any questions about the relationship of salary to amount of experience and to amount of education in the case of these groups of teachers, and for comparisons with the status of this relationship at any date in the future.

These 98 tables will be found in full in section IX of No. 404 of the Bulletins of the United States Bureau of Education, "The Teaching Staff of Secondary Schools in the United States," by Edward L. Thorndike. I give here the tables for men and women of four years, and of eight years, of education beyond the elementary school.

It is practically impossible to summarize in words the relationship between salary and length of experience, because of its complexity.

There is no uniform tendency for a given difference in length of experience to be accompanied by a constant gross or percentile difference in salary. The upper range of salaries varies with experience more than the average salary. The relation is different in the case of those of much and those of little education. There are other eccentricities. For an adequate measurement of the relation one would have to repeat every detail of the 98 tables. I shall state only those general facts which are of most significance to educational administration. These are as follows:

The Relation of Salary to Experience in the Case of Men Teachers

The high-school authorities in the three States under consideration pay the average male high-school teacher on the average $28 (*i. e.* 4 per cent of the usual salary for the first three years of teaching) for each year of experience from 1 to 12 years, $8 a

TABLE 19

RELATIONS BETWEEN SALARY, AMOUNT OF EDUCATION, AND EXTENT OF EXPERIENCE OF MALE HIGH-SCHOOL TEACHERS IN OHIO, ILLINOIS, AND WISCONSIN

MEN OF 4 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

SALARIES	YEARS OF EXPERIENCE						
	0 to 2	3 to 5	6 to 9	10 to 14	15 to 19	20 to 24	25 and over
Under $400	.....	2	1	.....	.....	.....	.....
$400 to $499	4	10	5	4	1	1	1
$500 to $599	7	8	4	4	3	2	.....
$600 to $699	4	11	11	11	4	1	5
$700 to $799	2	2	6	3	6	2	1
$800 to $899	.....	3	2	6	.....	3	.....
$900 to $999	.....	.....	4	2	1	1	1
$1,000 to $1,099	.....	4	3	2	3	1	1
$1,100 to $1,199	.....	.....	.....	2	.....	.....	.....
$1,200 to $1,299	.....	1	2	2	.....	.....	.....
$1,300 to $1,399	.....	.....	.....	4	1	1	1
$1,400 to $1,499	.....	.....	.....	2	2	1	4
$1,500 to $1,999	.....	.....	.....	2	1	2	2
$2,000 to $2,499	.....	.....	.....	.....	.....	.....	.....
$2,500 and over	.....	.....	.....	.....	.....	.....	.....

MEN OF 8 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

SALARIES	YEARS OF EXPERIENCE						
	0 to 2	3 to 5	6 to 9	to	15 to 19	20 to 24	25 and over
Under $400	.....	.....	.....	.....	.....	.....	.....
$400 to $499	15	2	1	.....	1	.....	.....
$500 to $599	23	13	6	3	1	2	1
$600 to $699	35	23	15	1	1	1	2
$700 to $799	22	27	19	7	5	2	2
$800 to $899	15	25	16	10	8	.....	1
$900 to $999	1	27	18	12	3	4	1
$1,000 to $1,099	3	20	23	8	8	6	4
$1,100 to $1,199	.....	4	8	7	.....	2	.....
$1,200 to $1,299	2	8	9	11	5	2	1
$1,300 to $1,399	.....	3	7	5	4	1	.....
$1,400 to $1,499	.....	2	3	8	3	2	.....
$1,500 to $1,999	.....	.....	10	20	13	11	6
$2,000 to $2,499	.....	.....	.....	2	1	3	5
$2,500 and over	.....	.....	.....	1	2	3	4

TABLE 20

RELATIONS BETWEEN SALARY, AMOUNT OF EDUCATION, AND EXTENT OF EXPERIENCE OF FEMALE HIGH-SCHOOL TEACHERS IN OHIO, ILLINOIS, AND WISCONSIN

WOMEN OF 4 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

SALARIES	YEARS OF EXPERIENCE						
	0 to 2	3 to 5	6 to 9	10 to 14	15 to 19	20 to 24	25 and over
Under $400	2	2	1	.....	.....	1	.....
$400 to $449	3	3	2	1	.....	.....	.....
$450 to $499	3	1	4	1	.....	.....	.....
$500 to $549	3	7	2	1	1	2	1
$550 to $599	.....	.....	.....	1	.....	.....	.....
$600 to $649	2	5	.....	1	2	.....	2
$650 to $699	.....	.....	1	1	1	.....	.....
$700 to $749	1	2	.....	3	.....	2	2
$750 to $799	.....	.....	1	.....	2	1	1
$800 to $849	1	.....	.....	.....	.....	.....	.....
$850 to $899	.....	.....	.....	.....	.....	1	.....
$900 to $949	1	.....	2	.....	.....	1	.....
$950 to $999	.....	.....	.....	.....	.....	.....	.....
$1,000 to $1,099	.....	.....	.....	1	.....	.....	.....
$1,100 to $1,199	.....	.....	1	.....	1	.....	.....
$1,200 to $1,299	.....	.....	.....	.....	1	2	6
$1,300 to $1,399	.....	.....	.....	2	3	3	.....
$1,400 to $1,499	.....	.....	.....	.....	2	1	1
$1,500 to $1,999	.....	.....	.....	.....	.....	1	6
$2,000 and over	.....	.....	.....	.....	.....	.....	.....

WOMEN OF 8 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

SALARIES	YEARS OF EXPERIENCE						
	0 to 2	3 to 5	6 to 9	10 to 14	15 to 19	20 to 24	25 and over
Under $400	3	.....	.....	.....	.....	.....	.....
$400 to $449	9	.....	.....	1	.....	.....	.....
$450 to $499	50	11	1	1	.....	.....	.....
$500 to $549	52	29	5	.....	1	2	.....
$550 to $599	27	15	6	3	.....	.....	.....
$600 to $649	34	38	14	3	.....	1	2
$650 to $699	16	31	25	1	2	.....	.....
$700 to $749	8	28	22	17	3	.....	.....
$750 to $799	4	17	16	2	3	1	.....
$800 to $849	7	15	19	5	3	.....	.....
$850 to $899	1	2	7	4	3	1	.....
$900 to $949	2	3	10	6	1	2	.....
$950 to $999	.....	1	4	.....	.....	1	.....
$1,000 to $1,099	1	9	6	2	2	.....	2
$1,100 to $1,199	.....	2	5	1	1	.....	1
$1,200 to $1,299	.....	2	4	9	.....	.....	.....
$1,300 to $1,399	.....	.....	6	9	3	1	3
$1,400 to $1,499	.....	.....	2	7	5	3	1
$1,500 to $1,999	.....	.....	.....	3	2	5	4
$2,000 and over	.....	.....	.....	.....	1	1	1

year for each year from 12 to 22, and little or nothing for each year thereafter. The superior teachers show larger differences with experience. The men who have had the most education not only are paid more at the start, but also show larger differences with the first 10 or 15 years of experience, those with 8 years beyond the elementary school showing differences with experience that are about five times as large as those of men with 0–3 years, over twice as large as those of men with 4–6 years, and one and a half times as large as those of men with 7 years.[1] The differences between the salaries of those with 10–15 and those with 20–30 years of experience seem to be on the average the same for those of little and those of much education.

The Relation of Salary to Experience in the Case of Women Teachers

The school authorities in the three States in question pay the average female high school teacher on the average $27 (*i. e.* 5 per cent of the usual salary for the first three years of teaching) for each year of experience from 1 to 22 and apparently even to 30 or over. The superior teachers show larger differences with experience. The women who have had the most education not only are paid more at the start, but also show larger differences, not only for the first 10 or 15 years of teaching, as with men, but

[1] The somewhat awkward form of verbal statement used here and later is necessary to avoid giving the impression that the same person would receive the advances and discounts described if he had the increase in experience or education or the decrease in the latter corresponding to the differences described. Such may be true, but it does not necessarily follow from our facts. For education and experience not only alter individuals from what they were or would have been, but also select individuals. The teachers who have taught 20 years are a selected group of those who have taught 2 years and their salaries need not be equal to what the latter would attain if they taught 18 years longer. The teachers who studied 8 years may be different by nature as well as by training from those who studied only 4 years.

throughout. Women with 8 years of education beyond the elementary school show differences with experience that are five times as large as those of women with 0 to 3 years, over twice as large as those of women with 4–6 years, and over one and a half times as large as those of women with 7 years.

The Relation of Salary to Length of Education

It is also impossible to state the relation between salary and length of education adequately in words. There is again in this case no uniform tendency, though the eccentricities are here not so marked. There is also a special difficulty in that the increases from 0 to 9 years of education do not mean additions of equal amounts of the same thing. For instance, the group with 8 years of education are mostly college graduates, while the group with 6 years of education have rarely completed two years of a college course. The original tables tell the whole story, certain features of which I shall repeat in verbal form.

The high school authorities in the three States pay the average male high school teacher on the average $90 (or one-seventh of the usual salary for the first three years of teaching) less, if he is one year short of the standard 8 years; they pay him on the average $220 (or one-third of the usual salary for the first 3 years) less, if he is 3 years short of that standard; and $325 (or over half that salary) less, if he is 6 years short of that standard. For a year in addition to the standard they pay him on the average $90 more. All these differences are smaller for those of little experience in teaching and greater for those of much.

The corresponding figures for women teachers are $75, $150, and $275 less, for 1, 3, and 6 years short of the standard 8 years, and $45 more for 1 year over that standard. These amounts are, respectively, one-seventh, two-sevenths, over half, and one-eleventh of the usual salary for the first three years of teaching.

It is evident that school authorities reward the kind of man or woman who has secured a thorough education; and that, in so far as their practice is a natural selection of one means of securing efficient teachers, premiums for advanced education are desirable in formal salary schedules. The figures indeed suggest that the premiums now given in such formal salary schedules are too low in the case of education and too high relatively in the case of experience in teaching.

Neither experience in teaching nor amount of education is so important in determining relative salaries as the differences amongst teachers in other respects; that is, in native gifts and in the quality rather than the quantity of their education. That teachers of the same amount of experience and education vary enormously as to salaries is shown by every group recorded in the tables. For instance, of the men who have taught from ten to fourteen years and who had each 8 years education in advance of the elementary school, some receive four, and even five, times as much per year as others.

Dr. L. D. Coffman ['11] has measured these relations in the cases of a miscellaneous group made up very largely of elementary school teachers, from the United States as a whole. He writes:

"The salary paid teachers in general, particularly where free competition obtains, is one criterion or objective measure of their efficiency in general. Common observation and common sense teach us that in the case of numerous individuals and of certain communities and institutions, salaries cannot be regarded as true measures of efficiency. That they cannot is due: (1) to the operation of idealistic, sentimental, religious, political, blood-kin considerations; (2) to the unfair and unequal administration of municipal or commercial affairs in the distribution of moneys for the maintenance of the different forms of public protection and public service; and (3) to the lack of definite standards by which to judge teaching efficiency. Nevertheless it seems true as a

general proposition that differences in salaries in a given locality in either sex must be regarded as indicative of differences in teaching efficiency; and also differences in salaries among different localities, provided the communities compared have approximately equal standards of living and are of equal wealth, and competition among teachers is equally free, indicate different community estimates of teaching efficiency.

"No effort is made in the tables that follow to compare salaries in a given community or between given communities. The tables merely show what the general tendency is, to what extent salaries in general are influenced by experience. Supposing that the standards of living in the different places in this report do not differ radically, this general tendency becomes a fairly accurate registration of the value American people set upon experience. . . .

TABLE 21

TABLE SHOWING RELATION OF EXPERIENCE OF MEN TEACHERS TO SALARY

SALARY	YEARS OF EXPERIENCE															
	0	1	2	3	4	5	6	7	8	9	10	11–12	13–14	15–19	20–24	25–+
$150	5	2	4				1	1			1		1			
200	5	9	2	6	2	2	1			1	1				2	
250	29	12	5	7	6	3		2	2	2			3	2		4
300	30	13	10	6	4	4	5	2	2	3		3	2	4	1	2
350	13	20	14	12	14	14	8	2	5	9	4	9	2	8	11	11
400	10	9	11	14	11	6	9	6	7	5	3	7	7	9	6	5
450	10	7	7	5	11	5	11	5	5	4	1	8	7	11	9	12
500	3	2	6	4	3	3	2	3	2	2	3	4	6	4	5	11
550	1	1	4	3	3	7	2	3	2	3	1	3	2	7	3	7
600	3	2	6	6	6	5	6	4	6	5	2	2	5	6	3	7
650	1	2	4	3	2	2	7	6	4	2	3	2	4	5	5	8
700	1	2	1	3	2	1	4	1	2	1	1	1	1	1	2	6
750			2	4		2	2	1			2	3	3	2		
800		2	2	1	3	3	1	2			4	5	4	5	5	7
850		1			2	1			1				2	1		1
900		1	3	2	2	2	3	2	3	1		2	4	6		1
950		1					2	1	3	1	1	4		2		3
1,000		2	2	3	4	3	5	1	3	4	6	7	10	16	3	10
1,250					2	2	1	1		3	3	4	3	5	4	6
1,500					1		4						2	7	4	4
1,750									1		1	3	5	1	1	6
2,000								1					1	2	5	2
Total	111	88	83	79	78	65	74	44	48	46	37	67	74	102	69	113
Median	$328	370	430	430	459	485	550	517	525	488	692	592	675	680	558	632

" Table 21 shows that the 111 men teachers with no experience are receiving salaries ranging from $150 to $700; that 88 men teachers with one year of experience are receiving salaries ranging from $150 to $1,000, and so on. Table 22 reads in the same way for women.

TABLE 22

TABLE SHOWING RELATION OF EXPERIENCE OF WOMEN TEACHERS TO SALARY

SALARY	YEARS OF EXPERIENCE															
	0	1	2	3	4	5	6	7	8	9	10	11–12	13–14	15–19	20–24	25 +
$150	39	21	18	13	11	8	4	2	3		1	1			2	
200	36	29	18	7	5	3	3	1	1	1	1	1		1		
250	73	68	28	25	17	10	6	9	3	2	2	3		6		1
300	104	107	53	53	21	20	10	14	5	5	5	7	5	8	1	1
350	74	103	63	51	43	38	32	16	11	17	10	10	12	9	10	5
400	65	93	110	55	43	38	29	27	12	11	16	14	9	16	6	7
450	47	53	57	58	62	39	45	20	24	21	27	21	26	27	15	22
500	24	23	43	25	35	42	33	14	23	11	15	12	12	16	16	9
550	7	9	22	10	28	14	9	24	11	2	8	15	11	28	5	13
600	4	14	19	23	19	18	41	30	26	22	29	32	28	50	31	21
650	7	7	14	9	24	13	12	12	11	3	14	8	7	15	8	11
700		7	6	9	6	7	5	2	6	3	4	11	8	14	7	6
750	1	4	3		4	6	6	7	3	5	4	5	8	8	7	6
800	1	1	1	4	5	5	7	8	7	7	12	15	8	11	15	20
900			1		2	1	3		1		4	3	1	4	11	11
1000											1	1	3		6	7
Total	482	539	456	342	325	262	245	186	147	110	153	159	138	213	140	140
Median	$345	372	422	420	468	468	493	514	532	495	548	568	564	592	624	629

" The median salary of men with no experience is $328, with one year of experience $370, with two years $430, with ten years $692, etc. The median salary of women with no experience is $345, with one year of experience $372, with two years $422, with ten years $548, etc.

" The tables show that the income of a group with a given experience, varies greatly. The ratio with which this income increases also varies greatly with individuals, some reaching their maximum in three years while others take twenty. In the main, however, all salary advances due merely to experience take place comparatively early in the teacher's career."

Dr. Coffman measured also the relation of salary to length of

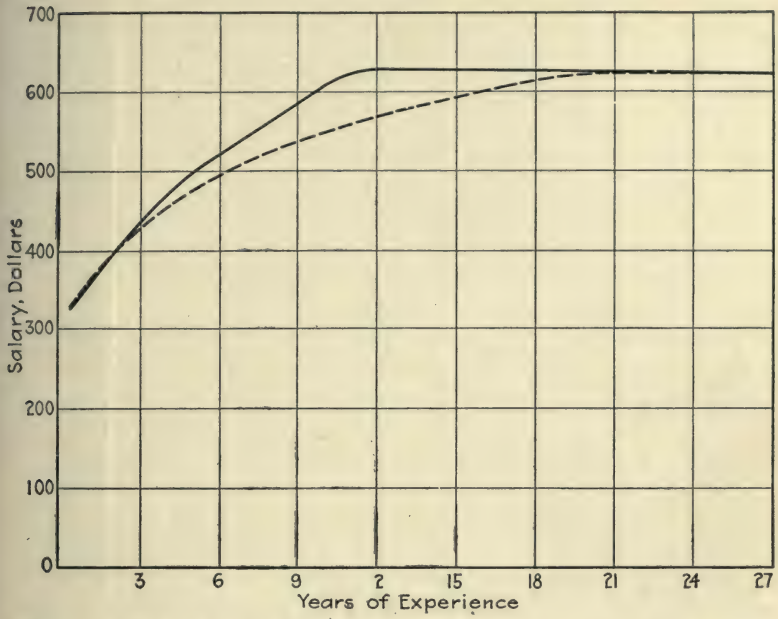


FIG. 11. The relation of length of experience to salary, using the median salaries to determine the graph. The solid line is for men teachers; the broken, for women teachers. The horizontal line is the scale in length of experience in years. The vertical scale represents the amount of salary.

education. I quote only the median salaries for the different amounts of education beyond the elementary school. These were, for men and women separately:

MEDIAN SALARIES IN DOLLARS PER YEAR

	0	1	2	3	4	5	6	7	8	9 or more
Men	455	411	421	438	457	534	658	800	975	1083
Women	405	376	426	449	424	471	510	561	638	650

The essential facts can be seen most easily in graphic form, as in Figure 12. Of these facts Dr. Coffman says:

"There is no uniform tendency or relation existing between salary and education. 'Education' in this report means training

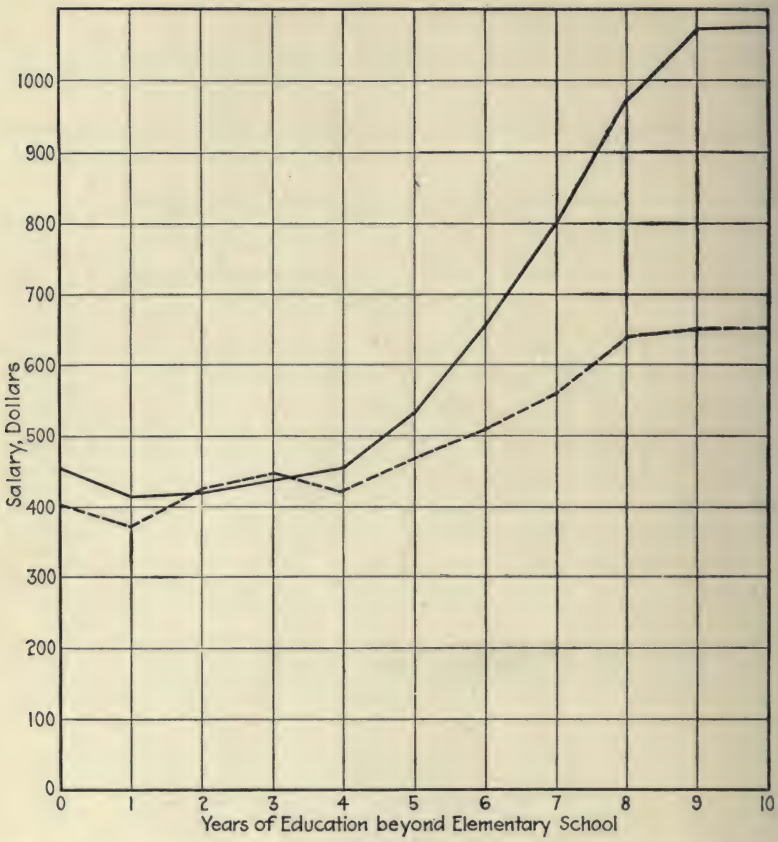


FIG. 12.—The relation of salary to amount of education, using the median salaries to determine the graph. The solid line is for men teachers; the broken line is for women teachers.

beyond the elementary school; it covers high school, normal school, and university work. One year therefore is not of equal value with another year. Those with four years of training are in most cases high school graduates, those with six years normal school graduates, those with eight years college graduates. . . .

"Two extremely important facts are revealed by this relation-

ship: (1) The first four years of training beyond the elementary schools have little or no effect upon salary; (2) correlation between salary and education becomes increasingly marked with each succeeding year after the fourth year. A premium is thus placed upon advanced academic and professional training. No doubt such training selects those who have the inborn capacity to profit by it most, but this extra training is their one best means of advertising to the world their peculiar native strength.

"As the standard number of years of training teachers have had is four, and as they receive a median salary of $457, public school authorities pay the average male teacher with 5 years of training $77 more; with 6 years of training $201 more; with 7 years of training $343 more; with 8, $526 more; and with 9 or more years, $626 more.

"The average female public school teacher with 5 years of training receives $47 more than the standard; with 6 years, $86 more; with 7 years, $137 more; with 8 years, $214 more; and with 9 or more years, $231 more."

§ 10. The Social and Economic Status of Teachers

Who are the teachers of our children? The answer to this question will throw much light upon the attempt to evaluate the education which we are offering to our citizens of to-morrow. We are in the habit of saying that teachers should have more salary. What kind of teachers do we get for the money we pay? Is there any relation between the amount of salary a teacher receives and the amount of training secured by him? From what social group do teachers come? These and many other similar questions must be answered by any one who would attempt to judge of the efficiency of our public systems of education. In the investigation by Professor L. D. Coffman entitled "The Social Composition of the Teaching Population," we have the answer to our questions.

Dr. Coffman's research is based upon the answers received to a questionnaire which was answered by 5,215 teachers selected at random in seventeen states. Most of the answers were secured from teachers who were in attendance upon their annual institutes. The purpose of the questionnaire was explained and replies were received from *all* of those present. Only a few of Dr. Coffman's tables of results can be presented here. The order in which they are given is chosen by the writer. The tables are in the main self-explanatory.

When we ask, Who are the teachers of our children, we must inquire concerning the families from which teachers come. The social status and the income of the parents of teachers limits the social inheritance which these teachers transmit to children. The following tables giving the occupations of parents, their income, and the number of brothers and sisters present a clear

picture of the social and economic groups represented by the families from which teachers are recruited.

TABLE 23

RACE AND NATIVITY OF WOMEN TEACHERS

RACE AND NATIVITY	WOMEN 16 YEARS OF AGE AND OVER								
	AGGREGATE			IN CITIES HAVING AT LEAST 50,000 INHAB.			IN SMALLER CITIES AND COUNTRY DISTRICTS		
	Total	Teachers		Total	Teachers		Total	Teachers	
		No.	Per 10,000		No.	Per 10,000		No.	Per 1,000
Native white, both parents native	12,130,161	207,823	171	1,703,955	35,514	208	10,426,206	72,309	165
Native white, one or both parents foreign born	4,288,969	88,449	206	1,700,209	30,670	180	2,588,760	57,779	223
Foreign born, white	4,403,494	17,218	39	2,095,206	7,553	36	2,308,288	9,665	42

TABLE 24

DISTRIBUTION OF MEN TEACHERS ACCORDING TO THE OCCUPATION OF THEIR FATHERS

	Ida.	Ill.	Ind.	Ga.	Ia.	Kan.	Md.	Minn.	Mo.	Mont.	N. H.	N. J.	N. Y.	Pa.	Tenn.	Tex.	Wis.	Total
Not answered	4	5	20				2		2			4	2	8	3	1	1	**52**
Farmers	29	47	245	6		21	27	4	81	3	2	33	75	71	14	9	20	**687**
Prof. men	2	4	13	6			7	1	4	1		7	8	8	2	5	1	**69**
Business	3	5	11	3		3	6	2	5			10	9	5	1		1	**61**
Artisans		4	20	2		1	5	2	1	1	1	7	6	24			3	**79**
Laborers	2	4	16		1		2		4		1	9	9	19			1	**69**
Pub. officials		3	1					1	1			2						**8**
Retired			5	1		2							1	3				**12**
Totals	40	72	331	18	1	27	49	10	98	5	4	72	110	138	20	15	27	**1037**

TABLE 25

DISTRIBUTION OF WOMEN TEACHERS ACCORDING TO THE OCCUPATION OF THEIR FATHERS

	Ida.	Ill.	Ind.	Ga.	Ia.	Kan.	Md.	Minn.	Mo.	Mont.	N. H.	N. J.	N. Y.	Pa.	Tenn.	Tex.	Wis.	Total
Not answered	3	17	44	6	3	4	26	2	12	5	2	31	29	18	3	3	6	**214**
Farmers	47	127	198	8	33	55	128	36	145	10	19	103	335	73	22	24	46	**1,409**
Prof. men	8	12	42	10	6	6	23	6	19	6		41	26	12	13	6	2	**238**
Business	14	26	82	13	4	11	58	11	40	2	10	106	47	36	23	4	4	**493**
Artisans	13	22	83	12	5	9	62	16	16	3	19	106	96	33	11	5	8	**519**
Laborers	7	30	35	2	22	6	34	10	23	2	4	61	76	37	6	2	4	**361**
Pub. officials	1	3	10			2	9	1	4	1		6	11	4	4		2	**58**
Retired	2	7	11	7	1		3	3	4			12	14	4	1			**69**
Invalids	1	1	1		1		1			1								**6**
Totals	96	245	506	58	75	93	344	85	263	30	54	466	636	217	83	44	72	**3,367**

TABLE 26

SUMMARY OF TABLES 24 AND 25 IN PERCENTAGES

	Men	Women
Percentage who are the children of farmers	69.7	44.8
Percentage who are the children of men in professional life	7.0	7.5
Percentage who are the children of business men	6.2	15.3
Percentage who are the children of artisans	8.0	16.4
Percentage who are the children of laborers	7.0	11.3
Percentage who are the children of public officials	.8	1.8

TABLE 27

THE RELATION OF THE OCCUPATION OF PARENTS OF TEACHERS TO PARENTAL INCOME

Income	Farmers			Professions			Business			Artisans			Laborer			Officials		
	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.
—$250	88	122	210	1	10	11	1	13	14	6	13	19	11	35	46		2	2
$250— 500	167	218	385	11	19	30	7	25	32	17	46	63	26	86	112	1	4	5
500— 750	118	182	300	9	29	38	7	25	32	18	75	93	15	109	124	2	5	7
750—1000	95	194	289	14	34	48	10	68	78	19	113	132	8	46	54	1	11	12
1000—1250	62	150	212	8	29	37	8	69	77	7	92	99	3	9	12	1	12	13
1250—1500	22	47	69	3	17	30	5	37	42	4	24	28		2	2	1	4	5
1500—1750	14	35	49	3	6	9	2	15	17	4	15	19	1	4	5	1	1	2
1750—2000	28	59	87	4	16	20	3	36	39	1	19	20	1		1		3	3
2000+	37	104	1141	5	33	38	15	101	116	3	28	31		3	3	1	8	9
			1742			261			447			504			359			58
Median			$730			$1025			$1219			$896			$542			$1058
Quartile			315			447			575			287			189			365

TABLE 28

THE RELATION OF NUMBER OF BROTHERS AND SISTERS OF TEACHERS TO THE OCCUPATION OF FATHERS

	Farmers			Professional			Business			Artisans			Laborers			Officials		
	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.	M.	W.	Tot.
0	32	77	109	4	10	14	2	31	33	8	45	53	5	19	24		1	1
1	75	151	226	11	37	48	4	77	81	11	74	85	6	52	58	1	7	8
2	74	175	249	8	44	52	6	80	86	16	90	106	13	62	75	1	16	7
3	78	226	304	11	38	49	8	86	92	7	99	106	7	61	68	1	4	5
4	72	184	256	9	42	51	11	67	78	8	65	73	7	54	61	2	12	14
5	79	175	254	8	13	21	7	58	65	12	53	65	6	30	36	1	5	6
6	64	142	206	2	20	22	7	41	48	1	41	42	7	27	34	1	4	5
7	57	110	167	2	14	16	4	25	29	6	16	22	2	16	18	1	3	4
8	44	73	117	3	9	12		11	11	4	16	20	3	16	19		3	3
9	25	51	76	3	10	13	5	10	15	3	12	15	2	3	5		2	2
10	13	23	36	4		4	3	3	6	2	5	7	2	3	5			
11	12	9	21	1		1		2	2	1	4	5		5	5			
12	6	7	13	1		1		1	1	1	1	2		2	2		1	1
13	2		2		1	1								1	1			
14	3	2	5															
15					1	1												
16	1		1															
17	1	1	2															
			2044			306			549			601			409			64
Median			4			3			3			3			3			4
25 P			2			2			2			2			2			2
75 P			6			2			6			6			5			5

The relation between parental income and years of training beyond the elementary school secured before beginning to teach and between parental income and the age at which teaching was begun appear in the following tables. The income of parents indicated in the table by 0, 1, 2, 3, etc., are (0) less than $250; (1) $250–$500; (2) $500–$750; (3) $750–$1,000; . . . . . (9) $2,250–$2,500.

TABLE 29

THE RELATION OF PARENTAL INCOME TO YEARS OF TRAINING OF MEN TEACHERS

Training	Parental Income									
	0	1	2	3	4	5	6	7	8	9
0	25	12	33	18	9	10	3	3	3	6
1	5	31	37	14	13	6	2		4	6
2	9	28	44	21	16	12	3	1	4	9
3	12	18	33	25	25	13	3	3	4	6
4	20	29	51	47	33	21	9	2	8	8
5	5	7	36	22	25	10	3	6	4	6
6	8	9	17	22	19	9	4	4	6	3
7	4	6	7	14	13	9	6	2	3	5
8	10	7	13	12	16	9	3	3	6	6
9	2	1	3	3	2	4				3
10	1		5	2	4	5	3		1	3
Totals	101	148	279	200	175	108	39	24	43	61
Median	3	3	3	4	4	4	4	5	4	4

TABLE 30

THE RELATION OF PARENTAL INCOME TO YEARS OF TRAINING OF WOMEN TEACHERS

Training	Parental Income									
	0	1	2	3	4	5	6	7	8	9
0	65	40	51	35	15	10	2	6	5	15
1	51	33	50	39	35	10	6	6	7	17
2	77	40	50	50	44	32	7	8	16	21
3	129	60	80	77	91	58	17	15	22	28
4	241	89	128	146	154	134	40	26	39	71
5	150	44	68	78	93	73	23	14	31	45
6	125	44	66	56	83	55	21	8	22	69
7	48	9	13	18	17	24	10	3	4	16
8	39	7	14	11	14	16	8	3	11	36
9	12	1	3	1	5	2	3		3	7
10	1	3	7	1	3	3	3			3
Totals	938	370	529	512	554	417	140	89	160	328
Median	4	4	4	4	4	4	4	4	4	5

TABLE 31

RELATION OF PARENTAL INCOME TO BEGINNING AGE OF MEN TEACHERS

Beginning Age	Parental Income								
	1	2	3	4	5	6	7	8	9
16	7	9	2	5	4	1	1		3
17	8	25	18	12	6	2	2	5	9
18	16	65	44	47	21	12	3	10	10
19	32	56	27	31	24	4	4	8	14
20	35	45	38	25	18	3	7	8	7
21	25	31	36	19	12	6	3	5	5
22	10	19	14	14	6	4		2	3
23	5	9	9	10	7	3	1		2
24	2	9	5	5	4		1	2	3
25	4	4	2	4	2	3	1		1
26		1	2	1	3			3	
27	2		1						
28	1	1	1				1		1
29				1		1			1
30		3			1				2
Totals	147	277	199	174	108	39	24	43	61
Median age	20.3	19.7	20.2	19.7	19.7	20.0	20.3	19.7	19.6

TABLE 32

RELATION OF PARENTAL INCOME TO BEGINNING AGE OF WOMEN TEACHERS

Beginning Age	Parental Income								
	1	2	3	4	5	6	7	8	9
16	17	25	18	10	16	3		3	13
17	57	66	50	53	48	9	10	16	15
18	107	139	163	176	100	29	20	39	76
19	62	95	98	137	105	33	29	36	62
20	54	105	88	87	62	20	16	21	47
21	39	49	40	38	35	20	6	15	61
22	19	25	22	24	17	9	2	10	18
23	6	8	13	9	12	5	3	6	15
24	2	7	4	9	4	4		3	8
25	3	2	4	1	2	3	1	4	3
26	2	1	3	3	2			2	1
27	3	3	1	1	2			1	1
28			1		1	1			2
29		2			3			1	
30	6	1	1		4			2	1
Totals	377	528	506	548	413	136	87	159	323
Median age	19.1	19.3	19.3	19.2	19.4	19.8	19.5	19.6	20.0

Dr. Coffman's conclusions, amply justified by the data studied, are given below. Attention is called in particular to the questions with which this summary closes.

"The Typical American Teacher"

"The typical American male public school teacher, assuming that he can be described in terms of the medians previously referred to, but remembering that a median is a point about which individuals vary and that our hypothetical individual is as likely to be below as above it, is twenty-nine years of age, having begun teaching when he was almost twenty years of age after he had received but three or four years of training beyond the elementary school. In the nine years elapsing between the age he began teaching and his present age, he has had seven years of experience and his salary at the present time is $489 a year. Both of his parents were living when he entered teaching and both spoke the English language. They had an annual income from their farm of $700 which they were compelled to use to support themselves and their four or five children.

"His first experience as a teacher was secured in the rural schools, where he remained for two years at a salary of $390 per year. He found it customary for rural school teachers to have only three years of training beyond the elementary school, but in order for him to advance to a town school position he had to get an additional year of training. He also found that in case he wished to become a city school teacher that two more years of training or six in all beyond the elementary school were needed.

"His salary increased rather regularly during the first six years of his experience, or until he was about twenty-six years of age After that he found that age and experience played a rather insignificant part in determining his salary, but that training still afforded him a powerful leverage.

"The typical American female teacher is twenty-four years of age, having entered teaching in the early part of her nineteenth year when she had received but four years training beyond the elementary schools. Her salary at her present age is $485 a year.

She is native born of native born parents, both of whom speak the English language. When she entered teaching both of her parents were living and had an annual income of approximately $800 which they were compelled to use to support themselves and their four or five children. The young woman early found the pressure both real and anticipated to earn her own way very heavy. As teaching was regarded as a highly respectable calling and as the transfer from school room as a student to it as a teacher was but a step, she decided upon teaching.

"Her first experience as a teacher was gotten in the rural school where she remained but two years. If she went from there to a town school her promotion was based almost solely upon her experience as no additional training was required by the officials of the town. If she desired to teach in a city school, she was compelled to secure at least one more year of training in all, but each additional year of training she found increased her salary.

"So far she has profited each year of her brief experience by having her salary increased and this will probably be true for the next two years should she find it necessary to remain in teaching that long.

"Into the hands of teachers who more or less nearly conform to the above description is given the duty of transmitting the culture of the race to the youth of the land, of training them in habits of thinking, in modes of behavior, in methods of work, and in intelligent appreciations. Some of the unanswered questions are: What initiative and resourcefulness have such teachers? What perspective due to thorough preparation have they secured? What vision of the possibilities of the calling do they possess? What modicum do they add to our professional inheritance? What chance has the average American boy or girl of being wisely and intelligently educated by the average American teacher, male or female?"

§ 11. The Supervision of Special Subjects

The practice of supervision varies widely in the United States. In most cities supervisors may be roughly classified into two groups; general supervisors who have oversight of all of the subjects taught in a school, a group of schools or one or more grades in a group of schools, and special supervisors who direct the work in a single subject in all of the grades of a group of schools. The first group of supervisors are variously named, superintendents, assistant and district superintendents, grammar grade and primary supervisors, and principals. In the second group are special supervisors of music, drawing, penmanship, manual training, physical education, sewing, domestic science. The general supervisors are the highest paid men and women in our school systems. They are expected to have general control of schools with respect to organization, curriculum, discipline, methods of instruction and the like. With the increase is administrative responsibility, found in the office of superintendent or of principal of a large school, these officers tend to pay more attention to organization and less to the efficiency of the teaching done in the schools under their direction. Their work is often supplemented by the primary or grammar grade supervisor who devotes almost all of his time to the professional growth of teachers, the proper organization of the course of study and the like.

With the introduction of new subjects with which the general supervisor is not familiar or which he feels unable to supervise adequately there is a demand for a special supervisor. These special supervisors vary in our cities from men and women who are merely special teachers to those who are in fact supervisors who direct the work of many special teachers or who train the regular

grade teacher to teach the special subject. The frequency with which these special supervisors or teachers are employed in cities having more than 8,000 inhabitants, the sex selection, the responsibility which these supervisors assume and the salaries paid to them are among the topics most carefully treated in Professor W. A. Jessup's "Social Factors Affecting Special Supervision." Some of the tables from Dr. Jessup's study are given below.

TABLE 33

PERCENTAGES OF CITIES REPORTING THE EMPLOYMENT OF SUPERVISORS OF SPECIAL SUBJECTS IN 1908

Music	85.42
Drawing	75.81
Penmanship	21.39
Manual Training	43.40
Sewing	18.60
Domestic Science	30.07
Physical Education	20.15

"In recent years there has been a striking increase in the number of cities employing specialists. This has been especially true of music, drawing and manual training. Distribution for the location of the cities brings out the fact that the early development of the practice of employing specialists has been largely confined to the states of the North Atlantic and the North Central divisions. Distribution for size of cities indicates that the practice has for the most part started in the larger cities, extending to the smaller cities later."

TABLE 34

THE DISTRIBUTION, BY SEX, OF SUPERVISORS OF SPECIAL SUBJECTS (1908)

(a) Distribution of men and women, by subjects and location.
(b) Percentage of women specialists, distributed by subjects and location.

	North Atlantic States			*South Atlantic States*			*South Central States*			*North Central States*			*Western States*			*United States as a whole*		
	Male	Fem.	Tot.	Male	Fem.	Tot.	Male	Fem.	Tot.	Male	Fem.	Tot.	Male	Fem.	Tot.	Male	Fem.	Tot.
(a)																		
Music	105	113	218	4	17	21	7	23	30	55	131	186	9	28	37	180	312	492
Drawing	37	149	186	4	13	17	2	27	29	15	136	151	5	32	37	63	357	420
Penmanship	35	18	53	3		3	7	4	11	22	18	40	6	6	12	73	46	119
Manual Training	65	28	93	15	4	19	16	2	18	91	17	108	23	2	25	210	53	263
Sewing		41	41		5	5		5	5		11	11		5	5		67	67
Domestic Sci.		50	50		19	19		14	14		69	69		19	19		171	171
Physical Edu.	15	34	49	2	5	7	3		3	26	18	44	7	5	12	53	62	115
(b)																		
Music		51.83			80.95			76.66			70.43			75.67			63.41	
Drawing		80.10			76.47			93.10			90.06			86.48			85.00	
Penmanship		33.94			10.00			36.33			45.00			50.00			38.65	
Manual Training		30.10			21.05			11.11			15.74			8.00			20.14	
Sewing		100.00			100.00			100.00			100.00			100.00			100.00	
Domestic Sci.		100.00			100.00			100.00			100.00			100.00			100.00	
Physical Edu.		69.38			71.42			0.00			40.90			41.66			54.78	

"A return postal card was submitted to a group of specialists in each subject selected at random.

Subject supervised..... Annual Salary..... Sex.....
Check (X) the method which most nearly describes yours.
( ) a. Special subject taught entirely by regular teacher.
( ) b. New material taught by yourself or assistants at regular intervals, followed by a drill on the same by the regular teacher.
( ) c. Special subject entirely under your charge and all lessons given by yourself or assistants.

"Three hundred and forty-three replies were received from the nine hundred and ninety-eight cards sent out. Of this number twenty-five were discarded on account of indefinite response. There remained three hundred and eighteen replies that were clearly answered. These were distributed as follows: eighty-three represented specialists in music; eighty-six in drawing; eighteen in penmanship; twenty-four in physical education; fifty-eight in manual training; thirty-three in domestic science and sixteen in

sewing. It is thus seen that the returns were related somewhat closely to the number of specialists in each field.

"These answers for each subject were thus distributed for method and size of cities."

TABLE 35

DIFFERENCES IN THE DIVISION OF RESPONSIBILITY (1910)

(1) SIZE OF CITY Plan	MUSIC			DRAWING			PENMANSHIP			PHYSICAL EDUCATION		
	A.	B.	C.	A.	B.	C.	A.	B.	C.	A.	B.	C.
8– 10,000		8	2	1	6	3		1			2	
10– 15,000		17	2	1	19	2		4	1		1	
15– 20,000	1	10	1		6	1		1	1			
20– 30,000	2	7		1	9	1	2	1			1	1
30– 50,000	3	6	2		14			3			2	
50–100,000	2	9		2	6	1		1			3	
100–200,000	2	2		1	1			1			3	1
200–1,000,000	4	1	1	2	5	2		2		2	8	
1,000,000 and over		1			2							

SIZE OF CITY Plan	MANUAL TRAINING			DOMESTIC SCIENCE			SEWING		
	A.	B.	C.	A.	B	C..	A.	B.	C.
8– 10,000	1		8			4			1
10– 15,000			6			4			
15– 20,000			3			2		1	1
20– 30,000	1	1	4			3			3
30, 50,000	1	3	3		4	4			
50–100,000		2	12			4		2	4
100–200,000		1	4		1	2	1		1
200–1,000,000	1		5			4	1	3	
1,000,000 and over		1	1			1			

(2) COMBINING IRRESPECTIVE OF SIZE OF CITIES

Plan	A.	B.	C.	Total
Music	14	61	8	83
Drawing	8	68	10	86
Penmanship	2	14	2	18
Physical Education	2	20	2	24
Manual Training	4	8	46	58
Domestic Science	0	5	28	33
Sewing	2	4	10	16

(3) PERCENTAGE OF CITIES FOLLOWING PLAN C

	Per cent
Music	9.6
Drawing	11.6
Penmanship	11.11
Physical Education	8.3
Manual Training	79.3
Domestic Science	84.8
Sewing	62.5

TABLE 36

MEDIAN ANNUAL SALARIES OF SUPERVISORS OF SPECIAL SUBJECTS (1908)

SUBJECT	MEN	WOMEN	MIDDLE 50 PER CENT	
			MEN	WOMEN
Music	$1,009.37	$748.38	$800–$1,300	$600–$ 900
Drawing	1,116.66	807.50	950– 1,750	650– 950
Penmanship	1,104.16	766.66	800– 1,300	600– 950
Manual Training	1,138.63	795.83	900– 1,500	650– 1,000
Physical Education	1,141.66	803.33	900– 1,500	600– 1,000
Domestic Science		804.16		600– 950
Sewing		742.80		600– 900

The tables given above which show salaries and responsibility assumed suggest certain questions concerning the current practice. It will be noted that one-fourth of the women supervisors get less than six hundred and fifty dollars. When this fact is related to the plan of work most commonly followed by these supervisors, one may question the wisdom of this kind of school organization. What can one expect from a six hundred dollar teacher who visits the classroom occasionally and teaches a lesson in music, drawing, or physical culture which is usually not vitally related to anything else which the children do. Fifty-six per cent of the supervisors follow this plan of work. Even the higher paid teacher who spends her time going from room to room teaching children with whom she is unacquainted, with very little time for conference with the room teacher, often with very little ability to train the regular teacher, may not be an entirely good investment. It has seemed to the writer that any subject taught in the regular classroom should be taught by the regular teaching staff. Out of a group of ten or of fifty teachers in any one building it ought to be possible to find teachers who could undertake work in music, drawing, penmanship, sewing and the simpler forms of manual training. There would be a distinct advantage in having one regular teacher teaching the music in three or four rooms

while other teachers with special ability undertook the work in drawing, penmanship or manual training. Such an interchange of work ought to make for strength all along the line. The special subjects would be taught by teachers acquainted with the children and with the whole curriculum. If such a plan of organization were followed, it would be the special function of a well paid *supervisor* to work with teachers of special talent and with more than usual interest in the field represented.

§ 12. The Teaching Staff of Secondary Schools in the United States [1]

The Nature of the Data and the Sources of Error

The data obtained from secondary schools concerning the status of their teachers came in response to the blank reprinted below. The data were not furnished at all in the case of some few public schools and many private schools. They were incomplete in still other cases, the optional list of individualized facts naturally being omitted as a general rule by the very large high schools.

There is probably a tendency on the part of those private schools which are below the standard in their locality in respect to the salaries and preparation of their staff, to withhold the data more frequently than is done by those which are above the standard. I should, in fact, consider that to estimate for private secondary schools as a whole from the selected group that do report, it would be proper to figure the non-reporting institutions as about 10 per cent lower than those reporting, in salaries and in the length of education of the staff.

There is a tendency to include in the reports teachers of the elementary grades, but this error can be detected by means of certain facts reported in the general blank. The staff of the United States Bureau of Education eliminated such cases from the records.

Special Inquiry Blank of the Bureau of Education

The information under "Special," in all probability, will not

[1] This section is in the main quoted from the *Bulletin of the U. S. Bureau of Education* with the same title by Edward L. Thorndike (Bulletin No. 4, 1909).

be asked for again for at least five years. It is therefore of the utmost importance that it be given in complete form and of course with great pains to attain perfect accuracy.

SPECIAL

Give below the number of teachers (including the principal) receiving in cash the approximate annual salary indicated. In case of a private school state how many of each salary receive board and lodging in addition.

	Less than $400	$400 to $499	$500 to $599	$600 to $699	$700 to $799	$800 to $899	$900 to $999	$1000 to $1099
Men								
Women								
Board and lodging								

	$1100 to $1199	$1200 to $1299	$1300 to $1399	$1400 to $1499	$1500 to $1999	$2000 to $2499	$2500 to $2999	$3000 or more
Men								
Women								
Board and lodging								

Give the number of teachers (including the principal) who have had regular high school, normal, college, or other higher education beyond the elementary school extending over the periods indicated.

	Less than 1 year	1 up to 2 years	2 up to 4 years	4 up to 6 years	6 up to 8 years	8 up to 9 years	9 up to 10 years	10 years or more
Men								
Women								

Give the number of teachers (including the principal) who have taught (previous to the year 1906–7) the number of years indicated.

	Less than 1 year	1 year	2 years	3 years	4 years	5 years	6 years	7 years
Men								
Women								

	8 years	9 years	10 to 14 years	15 to 19 years	20 to 24 years	25 to 29 years	30 to 34 years	35 years or more
Men								
Women								

ALTERNATIVE FORM

In lieu of the statistics asked for in the three special tables above, it would be more useful to the bureau to have the same information given in the form indicated in the table below. In column (A) give the name of the individual teacher; (B) sex; (C) salary per year in cash; (D) state whether or not board and lodging are included; (E) state the subjects which he, or she, teaches; (F) the number of years the teacher spent as a student in high school; (G) number of years as a student in a regular normal school, or other school of higher education beyond the high school; (H) years of teaching experience previous to this year.

The information given below will be treated as confidential with respect to the institution and individuals. In case the information requested be given in the following table, the summarized statistics asked for in the three special tables above may be omitted.

A	B	C	D	E	F	G	H
Names of High School Teachers	Sex	Annual Salary	Board and Lodging	Subjects Taught by Each	Years Education in H. S.	Years Beyond H. S.	Years Experience
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

....

(Signature and title of officer making this report.) (Post-office and street address.)

Errors in the Amount of Salary Reported

In the case of salary amounts there is the possibility, especially in the case of private schools in cities, that teachers who give only part of their time in return for the salary will be included without a note to that effect. This will, however, happen only rarely, for the institutions concerned will naturally protect themselves against any too low estimate of their salary schedule. Where some teachers receive much less than the general average for the school I have therefore been very cautious in including them. There are perhaps a very few such cases of part-time salaries included in the case of private schools in cities. On the other hand, there are counterbalancing cases of teachers in private schools who are required to give more time to the work for which the salary is paid than is the case in public high schools.

The inequality in the length of the school year for which the salary is given is not exactly a source of error, but is a factor which must be considered in interpreting the salary amounts, and particularly the variations toward very low amounts, which come largely from the Southern States.

It is not desirable to raise the salaries for school years of less

than the standard length, for the reason that, after all, the salary as it stands is, in most cases, the teacher's income. We do not know that he gets or can get a proportionate increase by utilizing the excess of leisure that he has. He probably very rarely does. It seems best, then, to omit any hypothetical correction of the data and to trust to the reader to remember that the average length of year for which the salaries stated are given is somewhat under the standard 180 school days, and also that some of the very low salaries are for short years. The length of year is not much below the standard, for the schools concerned are high schools, very few of which are situated in communities unable to support a full school year; and the very lowest salaries are often for a standard school year.

Errors in the Amount of Education Reported

The reports on the amount of education are the least secure and unambiguous. There is, on the one hand, a tendency to neglect the definite request to include years in high school in the computation. A record of 4 years in high school and 4 years beyond high school in the alternative form will thus be sometimes counted in the "4 up to 6 years" column instead of the "8 years" column. There is also a tendency to misunderstand the meaning of "up to" as "up through," and thus to score 4 years in the "2 up to 4 years" column, 6 years in the "4 up to 6 years" column and so on. The form of the blank was designed to give opportunity for properly counting parts of a year (as, for instance, attendance on summer sessions), but it would have been a less evil, perhaps, to have used the headings "1 year," "2 years," "3 years," "4 years," "5 years," and so on. There is, on the other hand, a tendency to estimate, as belonging to high school education, years which should, by the customary definitions, count only as elementary education, and to estimate as collegiate

education years which, by the customary definitions, should count only as secondary education. The alternative form gives a check upon the first two of these errors of the reporting officers in the many cases where it, as well as the upper part of the special form, is filled out.

In the cases where it is not filled out, usually cases of large schools, the internal evidence of the record or knowledge obtained from other sources can serve as a check. If, for instance, in a large Massachusetts high school we have a record like the following:

2 up to 4	4 up to 6	6 up to 8	8 up to 9	9
0	2	7	2	0

it is almost a certainty that the reporting officer put the sixes in the "4 up to 6" column, the eights in the "6 up to 8" column. For the completion of four years in high school and four years in college is so general amongst the teachers in Massachusetts high schools that the existence of a school of 11 teachers with only 2 of that degree of education is far less likely than the existence of error in the report.

In estimating the condition of the secondary school staff in general with respect to length of education from the returns of the present census I have, where both are given, taken the alternative form record in preference to the general distribution, have eliminated teachers in elementary grades, and have omitted from the calculation cases where it seemed highly probable that the reporting officer misunderstood the blanks; but I have not interfered with the reporting officer's judgment as to what constitutes elementary education or education in advance of it. If the undetected misunderstandings of the request to include high school education and of the meaning of "up to" outweigh the overestimations of the length of teachers' education beyond a typical elementary school, the general results will rate the length of the

education of secondary school teachers too low. If the reverse is the case, they will rate it too high.

I have gone to the pains of measuring the influence of these combined opposite errors in the case of public high schools by a special inquiry sent to 1,000 individual teachers. . . .

The returns from this special inquiry show that in the case of public high schools neither of these errors is of great magnitude in the original reports, and that they nearly counterbalance each other.

Errors in the Length of Experience Reported

The reports concerning length of experience in teaching are subject to five sources of error, one of which is important. These are: First, the tendency to report roughly, especially in round numbers; second, the tendency to avoid a statement of 0 years; third, the possible tendency of some women to reduce the number of years; fourth, the tendency of a school system to be generous in rating its staff for amount of experience; and fifth, the tendency to report the number of years of experience in the present school system, instead of the total number. This last source of error is the important one, because its frequency and its amount of influence cannot well be measured. For the other four, rational allowances can be made, so that no one of them does any harm of consequence. But the magnitude of the influence of the fifth, due to misunderstandings of individuals or recording officers, cannot be foretold. I have therefore gone to some pains to measure it with the help of the special inquiry described above.

The special inquiry shows that the error of reporting experience in the present school only is very rare in the case of the individualized returns, being made by only about one teacher in fifty. It is probably somewhat more frequent in the cases where the general table is made out by the school principal or secretary.

There is another tendency which is not really an error, except

in view of the wording of the blank, and of the fact that in the presentation of the data it is desirable to estimate the length of experience up to the year in which the given salary is received. This in the tendency of a person whose career is, say, 1904-5, first year of teaching, salary $500; 1905-6, second year of teaching, salary $600; 1906-7, third year of teaching, salary $725—to report, salary, $725; experience, three years. This occurs in over a third of the cases.

If the reader will bear in mind the nature of the data, he will nowhere be misled by the summaries that follow. In cases where the conclusions are subject to any considerable influence from the above mentioned sources of error in the original reports, the fact will be stated.

The Teaching Staff of Public Secondary Schools

Salaries. The salaries of men teachers in public high schools range from less than $300 to $3,500. If the principals of the schools are included the upper limit becomes $5,000. There is no one salary that can properly be called typical in the sense of representing a tendency about which all the salaries cluster closely. If one were compelled to choose one amount as the most likely amount to be received by a teacher or principal (in the vast majority of our high schools the principal is a working teacher, giving much over half of his time to class instruction and class management), the amount would be $700. Their median salary is $900; that is, of the men engaged in public high-school work there are as many who receive less than $900 as there are receiving more than $900. Of a hundred such men 5 receive less than $500, 51 receive from $500 up to $1,000, 27 from $1,000 up to $1,500, 10 from $1,500 up to $2,000, and 7 from $2,000 up. Over half (53 per cent) of them receive from $600 to $1,000, inclusive.[1]

[1] The $1,000–$1,099 group is composed, to about four-fifths of its membership, of salaries of exactly $1,000.

Figure 13 repeats these facts, and gives at a glance the general financial status of the men engaged in public high schools in the United States.

The salaries of women engaged in public high-school work range from less than $200 to the group $2,500–$2,999. As with the men, there is no one salary amount which is typical in the sense of representing a true central tendency; $550 would be the most

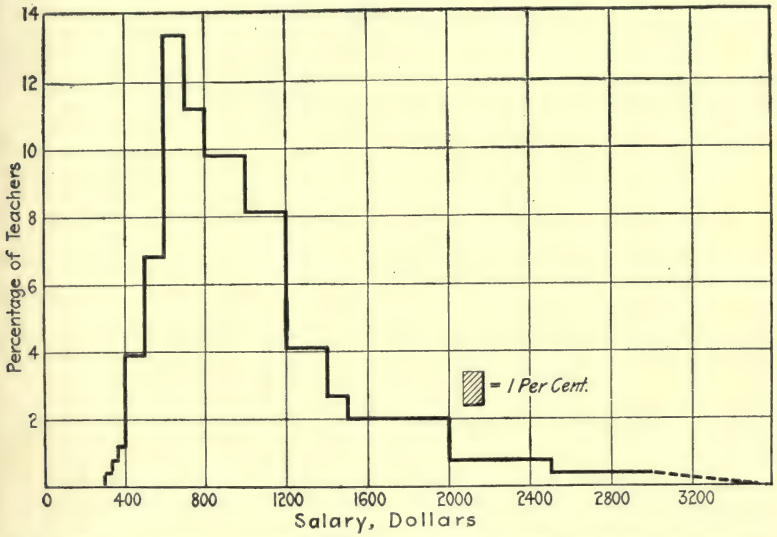


FIG. 13.—Relative frequencies of different annual salaries of men teachers in public high schools. The horizontal line is a scale of salary amounts from 0 up. The total area enclosed within the heavy line and the base line equals 100 per cent. The dash line is derived from estimates from too few cases to be very reliable.

suitable choice if a choice had to be made. Nor would it be so misleading as the corresponding $700 would be in the case of men; for half of the salaries are between $400 and $675, inclusive. The median salary is $650. Of a hundred women 22 receive less than $500, 59 from $500 up to $1,000, 14 from $1,000 up to $1,500, and 5, $1,500 and over. Figure 14 summarizes the general financial status of women engaged in public high-school work.

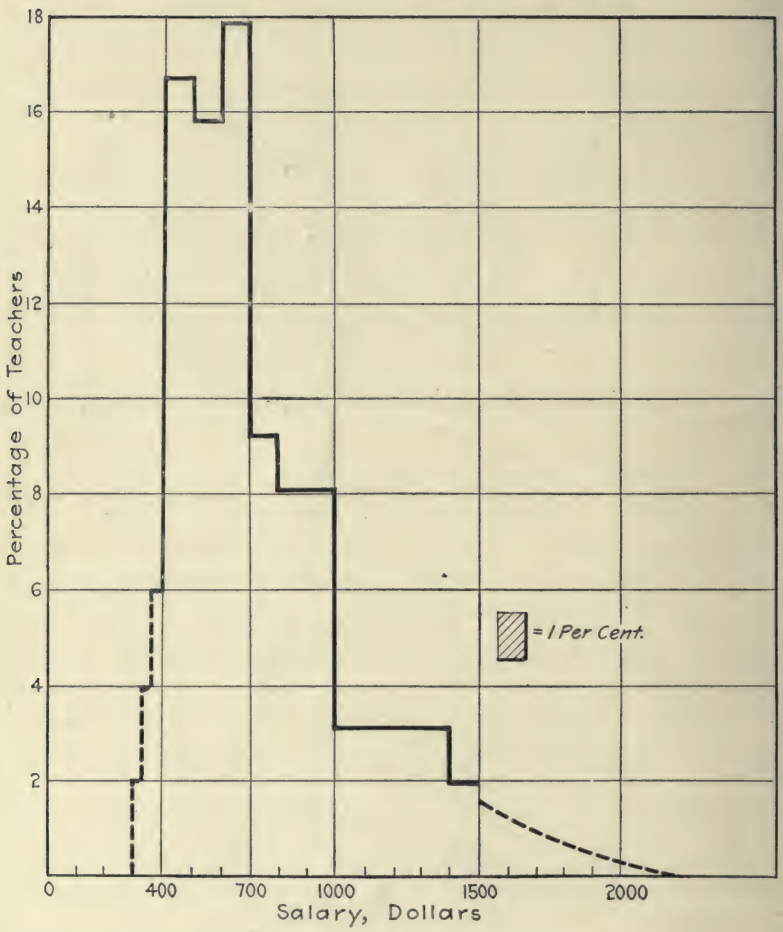


FIG. 14.—Relative frequencies of different annual salaries of women teachers in public high schools. For explanation of the diagram, see the legend of figure 13.

The Teachers' Education. The number of years that the man engaged in secondary school work spent as a student in high school, normal school, college, or other institution beyond the

elementary school ranges from 0 to 13, or possibly higher in a few cases. There is no close adherence to any one type the country over, though 8 years is the most common length. The median length is 7 years. Of a hundred men 10 have had less than 4 years beyond the elementary school, 45 have had from 4 up to 8 years,

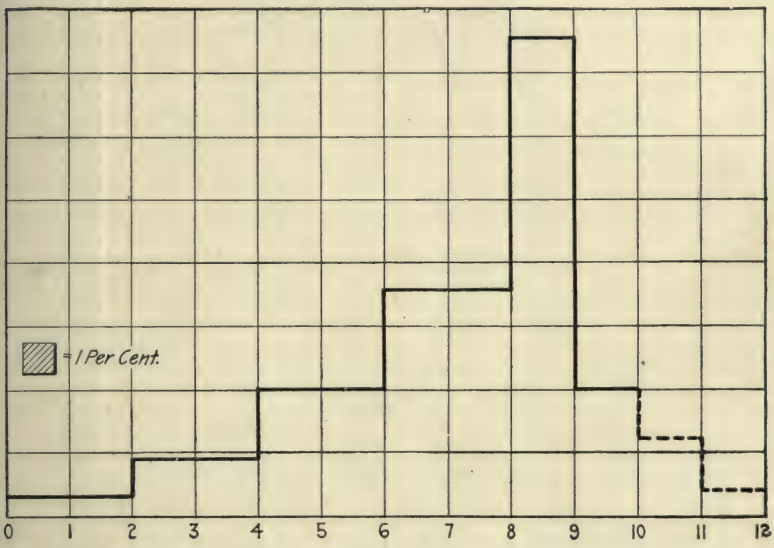


FIG. 15.—Relative frequencies of different amounts of education of men teachers in public high schools. The horizontal line is a scale of length of education beyond the elementary school (in years). The dash line is derived from estimates from too few cases to be entirely reliable.

30 have had 8 years, and 15 have had 9 years or more. Three-fifths have had 6, 7, or 8 years. Figure 15 shows the facts.

The length of education beyond the elementary school in the case of women teachers ranges from 0 to 12 years, or possibly higher in a few cases. The typical condition is 8 years. There are somewhat more women who have had 8 years or more than who have had 7 years or less. Of a hundred women, 6 or 7 have had less than 4 years beyond the elementary school, 40 or

41 have had from 4 up to 8 years, 41 to 42 have had 8 years, and 11 or 12 have had 9 years or more. Figure 16 shows the facts.

Experience in Teaching. The amount of experience in teaching,

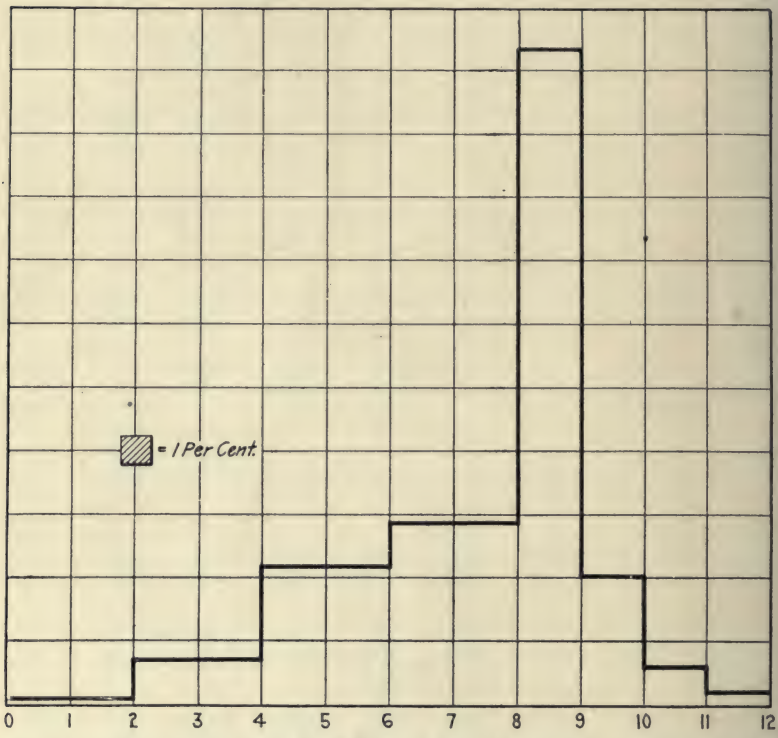


FIG. 16.—Relative frequencies of different amounts of education of women teachers in public high schools. For explanation of the diagram see the legend of figure 15.

previous to the year for which the salary was reported, as measured in years, ranges for the men from 0 to beyond 50, though there are only about three in a hundred who have taught over 30 years. The inquiry for a typical length would, of course, be

absurd. The median is probably 8 years. That is, as many public high-school men have taught over 9 years as have taught 7 years or less. Table 37 gives the facts as reported concerning the amount of experience of the men teachers and principals.

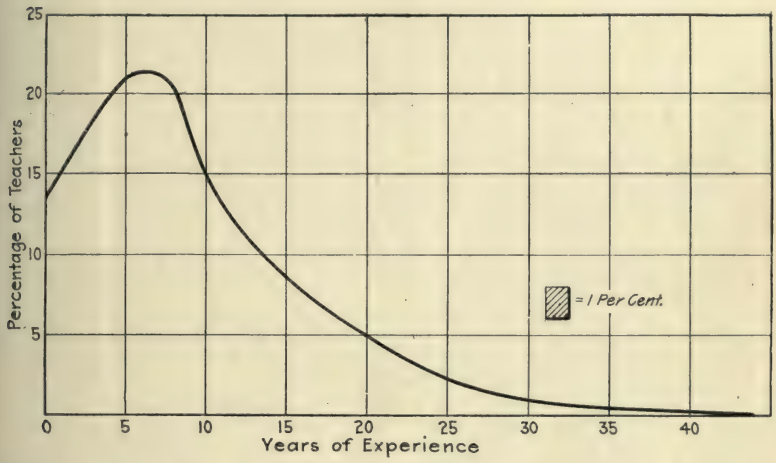


FIG. 17.—Relative frequencies of different amounts of experience in teaching of men teachers in public high schools. The total area between the heavy line and the base line equals 100 per cent.

Figure 17 gives the same facts corrected for the tendency to rough report and to over report round numbers, and also for the tendency to report the length of experience in the present position, to report cases of 0 years inaccurately, and to include the year for which the salary reported was received.

The length of experience ranges, for women, from 0 years to beyond 50, with about two in a hundred who have taught over 30 years. The median is probably 6 years. That is, probably as many public high-school women have taught 7 years or more

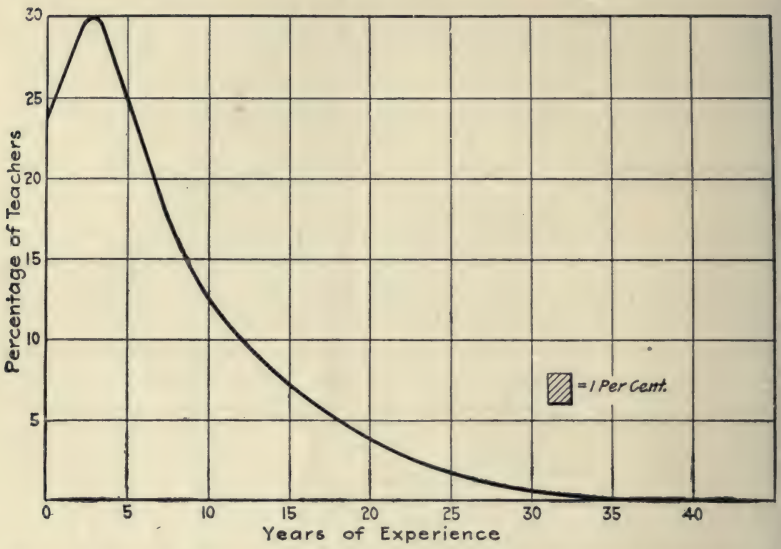


FIG. 18.—Relative frequencies of different amounts of experience in teaching of women teachers in public high schools.

as have taught 5 years or less. Table 37 gives the facts as reported. Figure 18 corresponds to Figure 17, giving for women the same information that Figure 17 gives for men.

TABLE 37

RELATIVE FREQUENCIES OF DIFFERENT AMOUNTS OF EXPERIENCE IN TEACHING IN THE CASE OF TEACHERS IN SECONDARY SCHOOLS AS REPORTED (IN PERCENTAGES)

Years of Experience in Teaching	Teachers in Public Secondary Schools				Teachers in Private Secondary Schools			
	Men		Women		Men		Women	
Less than 1	2.9		5.5		4.1		6.4	
1	5.2		6.8		6.6		7.4	
2	5.5	25.8	9.4	38.6	10.0	35.4	8.8	39.0
3	6.0		9.0		6.9		8.2	
4	6.2		7.9		7.8		8.2	
5	7.7		7.9		5.7		7.2	
6	6.3		6.7		4.9		7.2	
7	6.5	29.9	6.1	28.7	4.5	24.3	3.3	27.2
8	6.3		4.8		5.1		7.2	
9	3.1		3.2		4.1		2.3	
10–14	20.4		15.1		14.0		14.8	
15–19	12.0		9.0		8.0		9.9	
20–24	5.9		5.1		8.8		3.7	
25–29	2.2		1.7		5.7		2.9	
30–34	1.7		1.5		1.6		1.0	
35 and over	1.4		.4		2.3		1.6	

Men Teachers and Women Teachers Compared.[1]

Figures 19, 20 and 21 show the differences between men and women engaged in public secondary education with respect to salaries, amount of education, and amount of experience, as reported. That men are paid more is of course a familiar fact, but that they have less education as a preparation has been unnoticed, and that they remain in teaching so little longer than women is a fact which flatly contradicts common opinion. It is also to be

[1] The influence of the sources of error described earlier is so nearly the same for men and for women that the comparison may be made from the data as reported without risk of any error worth considering.

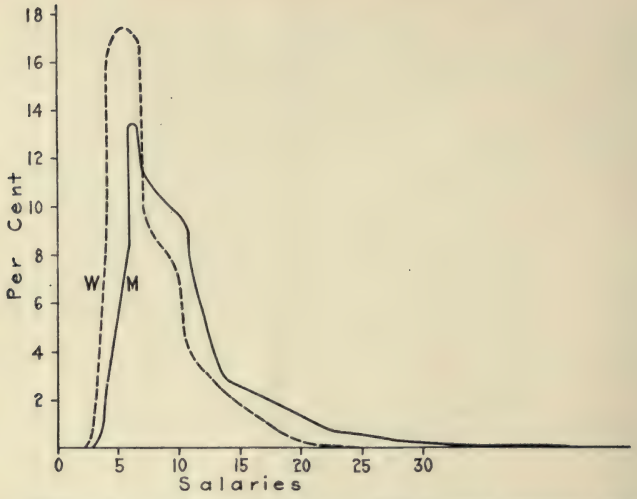


FIG. 19.—Men and women teachers in public high schools compared with respect to salaries. The continuous line incloses the surface of frequency for men's salaries. The dotted line incloses the surface of frequency for women's salaries. The horizontal scale gives the salaries in hundred of dollars.

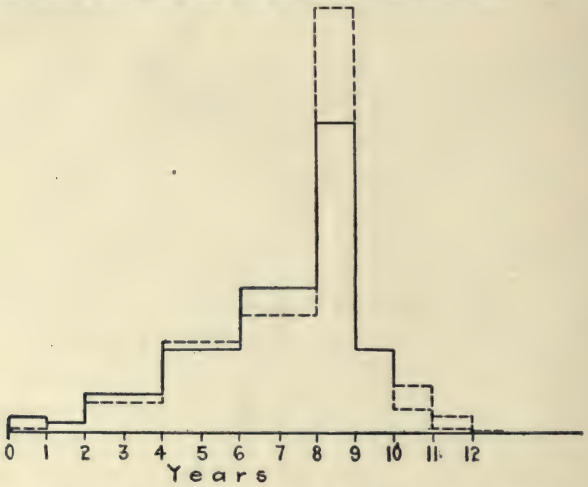


FIG. 20.—Men and women teachers in public high schools compared with respect to amount of education. The continuous line refers to men; the dotted line to women. The horizontal scale gives the number of years of education beyond the elementary school.

noted that there is not so much difference in the pay for the same (or ostensibly the same) work as the average salaries usually quoted mislead one into believing. The average salaries are compounded in part of, and overinfluenced by, the few large

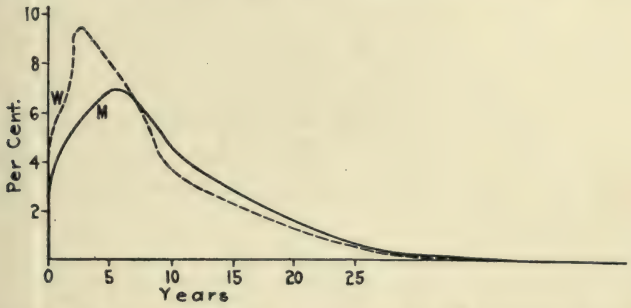


FIG. 21.—Men and women teachers in public high schools compared with respect to length of experience in teaching. The continuous line refers to men; the dotted line to women.

salaries paid to heads of departments, principals, and those whom we may call "managing teachers," who, without official recognition in title, are expected to do the lion's share in the organization and control of the school. All these are much more often men than women. Consequently, whereas in our group the average salary of a man is about 41 per cent greater than that of a woman, the modal salary (that is, the most frequent or most typical salary) is only 33.3 per cent greater.

Public and Private Secondary School Teachers Compared

It is a well known fact that public secondary education has been increasing more rapidly than private in respect to number of students, number of teachers, annual expenses, and the like. It is therefore of interest to compare the two with respect to the present condition of the teaching staff.

If the reports from public high schools in general and from

private high schools in general are compared, one gets the following results: The public high school men teachers are paid about a tenth less and have had, roughly, a half year less of education. The public high school women teachers, on the contrary, are paid about a tenth more than the private high school women, and have had, roughly, a year more of education. In length of experience there is no appreciable difference.

But such a comparison may be misleading, if taken at its face value, for two reasons. First, a much smaller proportion of the private schools send the information, and, as already remarked, there are good reasons for believing that those which withhold it are not quite so well off in the pay they give to their teachers or the amount of education which their teachers have received as those which do report. In the second place, the less well paid and less well trained teachers in the public high schools are found in the rural high schools with one or two teachers. In one sense it is fair to compare these schools with the private high schools and academies, as they are both coöperating in secondary education. In another sense it is not fair, because the private schools often require residence away from home at a distance. Under the same conditions the pupils of public high schools could attend a public high school much better equipped than the one-teacher or two-teacher schools in their immediate neighborhood. That is, to make the comparison by the general census perfectly fair, there should be private high schools distributed geographically in just the same fashion as the public high schools.

I have, therefore, made the comparison by taking public and private secondary schools where both exist in the same locality, asking, that is, the question, "In any one city, will the pupil who attends the local public secondary school be taught by a staff as well paid and as well educated as the pupil attending the local private secondary school?" Since the matter is not one of very great importance to educational welfare, I have measured

the difference in only 19 cities. The fact in these is, with almost entire uniformity, that the staff of the public school is better paid. Whether each city is given a weight proportional to its size or is weighted like all the others, the general result is found that the public high school man is paid at least 15 per cent more than the private high school man, and the public high school woman at least 30 per cent more than the private high school woman. The facts appear in Table 38. The public high school teachers in these cities have also had a more extended education though, in view of the influences described on pages 117-119, it is not possible to assign an exact percentage.

TABLE 38

RELATIVE FREQUENCIES OF DIFFERENT SALARIES IN PUBLIC AND PRIVATE SECONDARY SCHOOLS IN THE SAME LOCALITIES. PERCENTAGES ESTIMATED FROM NINETEEN CITIES

SALARIES	MEN		WOMEN	
	Public Schools	Private Schools	Public Schools	Private Schools
Less than $500	0	1	1	10
$500 to $999	4	24	26	59
$1,000 to $1,499	34	32	49	27
$1,500 to $1,999	31	22	21	3
$2,000 and over	31	21	3	2

§ 13. The Influence of the Sex Balance of the Teaching Staff upon High School Enrollment [1]

It always is, or should be, interesting to put speculations about education to the test of facts. The result often is, or should be, a warning to us against the intellectual crime of giving mere opinions where indolence is our only excuse for failing to verify them.

In the present article I propose to seek light on the very common opinion that the ratio of boys to girls in high schools, and in particular in the later grades of high schools, can be largely increased by increasing the percentage of men teachers in these schools.

The first question of fact which will be answered is: "Do the high schools which, while roughly alike in other respects, differ greatly in the proportion of male teachers, show corresponding differences in the proportion of male students?" The data used will be the statistics of public high schools in the 1906 Report of the U. S. Commissioner of Education. To get groups roughly alike, I omit, of course, schools for boys only or for girls only, manual training high schools, even though a few girls may be enrolled, and also, to avoid the possible admixture (through error) of teachers whose work is really in the elementary schools, all schools reported as having fewer than six secondary teachers. Further I keep separate the schools of each size, though in the summaries reported in the tables this separation is abandoned to save space and add to clearness.

I shall in general measure the proportion of boys among the

[1] This section is quoted with some abbreviation of tables, from an article with the same title in the *Educational Review* of Jan., '09 (Vol. XXXVII, No. I), by Edward L. Thorndike.

TABLE 39

SAMPLE OF THE DATA AND CALCULATIONS IN THE CASE OF THE RELATION OF THE PROPORTION OF MALE TEACHERS TO THE PROPORTION OF MALE STUDENTS IN PUBLIC HIGH SCHOOLS. TWELVE-TEACHER SCHOOLS

School	Number of Male Teachers	Number of Female Teachers	Percentage of Male Teachers	Number of Male Students	Number of Female Students	Percentage which the Number of Female Students is of the Number of Male Students
1	1	11	8.3	128	210	164
2	2	10	16.7	167	162	97
3	3	9	25	165	171	
4	3	9		111	110	
			Sums	= 276	281	102
5	4	8	33.3	93	132	
6	4	8		137	153	
7	4	8		146	179	
8	4	8		121	215	
9	4	8		100	145	
10	4	8		133	162	
11	4	8		130	238	
			Sums	= 860	1224	142
12	5	7	41.7	125	152	
13	5	7		104	137	
14	5	7		119	154	
15	5	7		145	138	
16	5	7		124	134	
17	5	7		80	98	
18	5	7		113	128	
19	5	7		126	187	
20	5	7		109	147	
21	5	7		129	243	
			Sums	=1174	1518	129
22	6	6	50	123	200	
23	6	6		98	116	
24	6	6		100	143	
25	6	6		165	176	
26	6	6		96	172	
27	6	6		115	118	
			Sums	= 697	925	133
28	7	5	58.3	147	164	
29	7	5		172	215	
			Sums	= 319	379	119
30	9	3	75	172	215	25

TABLE 40

THE RELATION OF THE SEX-BALANCE OF THE STAFF TO THE SEX-BALANCE OF THE STUDENT ENROLLMENT IN PUBLIC HIGH SCHOOLS OF FROM 6 TO 16 TEACHERS

Number of Male Teachers	Number of Female Teachers	Number of Male Students	Number of Female Students	Number of Female Students Divided by Number of Male Students (×100)	Per Cents of Male Teachers	Corresponding Per Cents which Female Students are of Male Students	Per Cents of Male Teachers	Corresponding Per Cents which Female Students are of Male Students
0	11	125	178	142	0	158	0–35	143
0	8	72	133	185				
0	7	113	159	141				
0	6	271	450	166				
1	12	171	213	125	8–17	146		
1	11	128	210	164				
1	10							
1	9	100	118	118				
1	8	829	1,355	163				
1	7	1,158	1,626	140				
2	14	309	519	168				
2	13	177	241	136				
1	6	1,690	2,403	142				
2	12	399	559	140				
2	11	414	755	182				
1	5	2,741	3,942	144	17–24	145		
2	10	167	162	97				
2	9	963	1,338	139				
3	13	538	843	157				
2	8	1,046	1,635	156				
3	12	516	629	122				
3	11	682	967	145				
2	7	1,633	2,364	145				
3	10	1,242	1,756	141				
2	6	1,968	2,863	145	25–29	143.5		
3	9	276	281	102				
4	12	162	291	180				
4	11	638	1,045	164				
3	8	945	1,489	158				
2	5	2,870	3,974	138				
4	10	897	1,155	129				
3	7	2,129	2,893	136	30–35	140.5		
4	9	314	351	112				
5	11	209	221	106				
2	4	6,130	8,735	142				
3	6	1,564	2,358	151				

TABLE 40—*Continued*

Number of Male Teachers	Number of Female Teachers	Number of Male Students	Number of Female Students	Number of Female Students Divided by Number of Male Students (×100)	Per Cents of Male Teachers	Corresponding Per Cents which Female Students are of Male Students	Per Cents of Male Teachers	Corresponding Per Cents which Female Students are of Male Students
4	8	860	1,224	142				
5	10	342	396	116				
5	9	396	591	149				
4	7	2,098	2,780	133	36–40	142	36–40	142
3	5	3,101	4,656	150				
6	10	1,094	1,474	135				
5	8	465	615	132				
4	6	858	1,269	148				
6	9	177	260	147				
							41–91	140

The original table continues up to schools with 91 per cent of their teachers men, 184,000 students being recorded. For the schools having from 40 to 91 per cent of their teachers men, the female students stand to the males in the ratio of 140 to 100.

students indirectly by the percentage which the girls enrolled are of the boys, as this saves much computation.

Table 39 shows the nature of the data used and the calculations made by one sample.

Table 40 summarizes the facts from schools with from six to sixteen teachers, inclusive.

Table 40 shows that there is only a very, very slight direct relation between the proportion of male teachers and the proportion of male students. With the 184,000 students recorded, the percentage of boys is less than 4 per cent more amongst the 84,607 in schools with from 40 per cent to 91 per cent of men teachers than amongst the 81,527 in schools with from 0 per cent to 35 per cent. The very few schools with no men teachers at all and those with over half of the staff men show decided differences, but the numbers are too small to be used as reliable evidence. Schools with from 30 to 50 per cent of men teachers show no

change in the percentage of boys. The general drift of the relation is such as may be expressed as follows:—The central tendency is to have 3 out of 8 teachers men and to have 142 girls for every 100 boys enrolled. For 33 1-3 per cent increase in the proportion of male teachers, one finds an increase of less than 1 per cent in the proportion of male students; for 66 2-3 per cent increase in the former proportion, one finds an increase of 2 per cent in the latter; and for an increase of 100 per cent in the former, an increase of 4 or 5 per cent in the latter. Where the former proportion is halved the proportion of male students drops only about 1 per cent and where it is reduced to a third, the drop in the latter is less than 2 per cent.

I have also computed the facts in the case of the 42 schools of 13 or more teachers (in 1906) having a percentage of male teachers of 24 or under and the 41 such schools having a percentage of male teachers of 47 or over. Although on the average the latter group have two and a half times as high a percentage of male teachers, they have a percentage of male students hardly any higher and a percentage of male graduates which is decidedly *lower* than is found in the schools with few men teachers. The facts are:

	Schools with from 11 to 24 Per Cent of Male Teachers	Schools with from 47 to 65 Per Cent of Male Teachers
Number of male students	9,117	9,210
Number of female students	12,687	12,667
Number of male graduates	986	746
Number of female graduates	1,480	1,444
Per cent of male students	42—	42+
Per cent of male graduates	40	34

Evidently the influence of the proportion of male teachers upon the proportion of male students, even when combined with whatever unreasoning tendency there is for school boards to provide a larger share of men teachers when the enrollment consists largely of boys and with the tendency of certain communities to

look with disfavor on the feminization of both the teaching profession and the school population, is very slight.

Its influence upon the proportion of each sex remaining through the high school might still, however, be demonstrable. The fact here could be best ascertained by a calculation of the correlation between the percentage of male teachers and a rather complex ratio, namely $\frac{\frac{B_4}{B_1}}{\frac{G_4}{G_1}}$ in which B_4 equals the enrollment of boys in the fourth year of high school, B_1 the enrollment of boys in the first year of high school, G_4 the enrollment of girls in the fourth year of high school, G_1 the enrollment of girls in the first year of high school. The calculation of this ratio for each school or group of schools with the same percentage of male teachers would, however, be a very laborious procedure and could at the best be done in the case of only the small proportion of schools which report enrollment by grades in the 1907 Report of the U. S. Bureau of Education. I have, therefore, taken a somewhat less significant but more easily and more widely available measure, namely the ratio which the male graduates are of the total graduates, using the data of the 1906 Report of the U. S. Commissioner of Education.

I shall then answer this second question of fact: "Do the high schools which differ greatly in the proportion of male teachers show corresponding differences in the proportion of male graduates?"

Table 41 summarizes the facts concerning this relationship. Of the 9,782 graduates in schools with from 0 to 33 1-3 per cent of their teachers men nearly 37 per cent are boys, and of the 9,421 graduates in schools with from 35.7 to 91 per cent of their teachers men almost exactly 37 per cent are boys. The differ-

ence is one-third of one per cent. The proportion of male teachers thus makes even less difference in the proportion of male graduates than in the proportion of male students as a whole. It appears, then, that the influence which made the slight correlation between the sex ratio of the staff and that of the student body was not in the main the attractiveness of men teachers to boys. For, in so far as it was that, the relation should be closer for graduates upon whom the supposed attractive force would have acted from one-half to three and a half years longer.

These facts are adequate to prove that in the medium sized public high schools of the country the proportion of boys who go to or stay through high school is almost or wholly irrespective of the percentage of men on the staff of the school. But since there is an independent body of evidence available which is interesting from other points of view as well as our present one, I shall present it also. This evidence is the change for each school in the percentage of male teachers in recent years taken in connection with the change for each school (1) in the percentage of male students and (2) in the percentage of male graduates. We may, that is, get the answer to the question: "To what extent have the schools which have been most feminized in their staffs been also most feminized in their student body and in their body of graduates?" I shall, in answering it, use first the reports of 1896 and 1906 for the co-educational public high schools (excluding evening high schools) in cities where there is one general high school of 12 or more teachers (in 1906).

TABLE 41

THE RELATION OF THE SEX-BALANCE OF THE STAFF TO THE SEX-BALANCE OF THE GRADUATES (FOR 1906) IN PUBLIC HIGH SCHOOLS OF FROM 6 TO 16 TEACHERS [1]

Number of Male Teachers	Number of Female Teachers	Number of Male Graduates	Number of Female Graduates	Number of Female Graduates Divided by Number of Male Graduates (×100)	Per Cents of Male Teachers	Corresponding Per Cents which Female Graduates are of Male Graduates.	Per Cents of Male Teachers	Corresponding Per Cents which Female Graduates are of Male Graduates
0	11	7	15	214	0	212	0–33.3	173—
0	8	6	11	183				
0	7	7	9	129				
0	6	28	67	239				
1	12	15	19	127	8–17	169		
1	11	10	36	360				
1	10							
1	9	10	15	150				
1	8	56	114	204				
1	7	94	181	193				
2	14	41	52	127				
2	13	23	35	152				
1	6	185	282	152				
2	12	44	75	171				
2	11	40	80	200				
1	5	332	573	173	17–24	180		
2	10	12	13	108				
2	9	87	159	183				
3	13	52	96	185				
2	8	97	212	208				
3	12	45	79	176				
3	11	87	139	160				
2	7	156	282	181				
3	10	180	243	135	23–29	174		
2	6	169	351	208				
3	9	49	46	94				
4	12	18	27	150				
4	11	61	123	202				
3	8	52	101	194				

[1] The schools reported in Table 41 are not identical with those reported in Table 40, since (1) the number of graduates is less often recorded in the Report of the U. S. Comm. of Education, and (2) the labor of calculation was somewhat lightened by omitting at random a fourth of the schools of from six to eleven teachers.

TABLE 41—*Continued*

Number of Male Teachers	Number of Female Teachers	Number of Male Graduates	Number of Female Graduates	Number of Female Graduates Divided by Number of Male Graduates (×100)	Per Cents of Male Teachers	Corresponding Per Cents which Female Graduates are of Male Graduates	Per Cents of Male Teachers	Corresponding Per Cents which Female Graduates are of Male Graduates
2	5	277	521	188				
4	10	95	153	161				
3	7	202	350	173	30–35	166		
4	9	21	58	276				
5	11	27	35	130				
2	4	704	1,168	166				
3	6	169	292	173				
4	8	103	138	134				
5	10	27	44	116				
5	9	43	69	161				
4	7	225	427	190	36–40	180		
3	5	334	681	204				
6	10	147	189	129				
5	8	60	103	172				
4	6	95	153	161				
6	9	15	23	163				
							35·7–91	171+

The original table continues up to schools with 91 per cent of their teachers men. The per cents of female graduates corresponding to per cents of male teachers, 41–49, 52, 53–59, and 60–91, are respectively 176, 162, 161 and 171.

The quantities whose relationships are to be measured are three ratios for each school:

I. The ratio of the change in the number of men teachers to the change in the number of women teachers, the changes being measured by percentile increments.

II. The ratio of the change in the number of male students to the change in the number of female students, the changes being measured by percentile increments.

III. The ratio of the change in the number of male graduates to the change in the number of female graduates, the changes being measured by percentile increments.

These somewhat complex verbal descriptions represent, of course, the following arithmetical expressions:

I.	II.	III.
M. T. '06.	M. S. '06.	M. G. '06.
M. T. '96.	M. S. '96.	M. G. '96.
F. T. '06.	F. S. '06.	F. G. '06.
F. T. '96.	F. S. '96.	F. G. '96.

In which M. T., M. S., and M. G. stand for Male Teachers, Male Students, and Male Graduates respectively, and F. T., F. S., and F. G. stand for Female Teachers, Female Students, and Female Graduates.

The 204 schools examined show an enormous range of difference in the feminization of the staffs—from a case where 8 men and 2 women have been replaced by 7 men and 10 women (that is, a ratio of .11) to a case where 1 man and 15 women have been replaced by 15 men and 16 women (that is, a ratio of 14.10). The central tendency is to a change of 88 per cent as much in men as in women.

The range of difference in the feminization[1] of the student body is of course less, but is still large, roughly from a ratio of .60 to one of 2.00.

The exact relation between the changes in staff and the changes in the student body is not clear in spite of the fact that the data include (for 1906) over 100,000 students. The facts are summarized in Table 42. In general it is clear from them that the addition of men teachers has made very little difference, and very likely none at all, in the proportion of male students. The same, but to a less degree, is true in the case of the relation between changes in the sex-balance of the staff and changes in the sex-balance of the graduates. The facts are summarized in Table 43.

[1] In these large schools the boys increased somewhat more than did the girls during the ten years in question. The country over, the girls increased about one per cent more.

The work of calculation of these relationships is so excessively tedious, especially for small schools, that I have not attempted to measure the fact in enough more schools to make the determinations final and precise within, say, 1 per cent. But I have supplemented them by similar calculations for the schools which had 10 or 11 teachers in 1906, for 50 schools (taken at random) which had 6 teachers in 1896, and for 33 schools in Massachusetts which had 4, 5, or 6 teachers in 1896. The facts in these cases are summarized in Table 44.

TABLE 42

RELATION OF CHANGES IN THE SEX BALANCE OF THE STAFFS OF PUBLIC HIGH SCHOOLS TO CHANGES IN THE SEX BALANCE OF THE STUDENT BODY. IN 204 LARGE HIGH SCHOOLS.

Change in Sex Balance of the Teaching Staff: $\frac{\text{M. T. '06}}{\text{M. T. '96}} \div \frac{\text{F. T. '06}}{\text{F. T. '96}}$	Change in Sex Balance of the Student Body: $\frac{\text{M. S. '06}}{\text{M. S. '96}} \div \frac{\text{F. S. '06}}{\text{F. S. '96}}$	Number of Students, in 1906, Involved in the Computation
0– .29	1.16	3,209
.30– .49	1.04	4,985
.50– .69	1.07	21,393
.70– .89	.975	21,272
.90–1.09	1.10	18,895
1.10–1.29	1.18	11,566
1.30–1.49	1.04	7,222
1.50–1.69	1.115	6,815
1.70–1.99	1.10	5,119
2.00 and over	1.23	10,653
Under .70	**1.08**	**29,587**
1.30 and over	**1.115**	**29,799**
0– .70	**1.08**	
.70–1.29	**1.06**	
1.30–1.99	**1.08**	
2.00 and over	**1.23**	

TABLE 43

THE RELATION OF CHANGES IN THE SEX BALANCE OF THE STAFFS OF PUBLIC HIGH SCHOOLS TO CHANGES IN THE SEX BALANCE OF THEIR GRADUATES. IN 204 LARGE HIGH SCHOOLS.

Change in Sex balance of the Teaching Staff: M. T. '06 ÷ F. T. '06 / M. T. '96 ÷ F. T. '96	Change in Sex Balance of the Graduates: M. G. '06 ÷ F. G. '06 / M. G. '96 ÷ F. G. '96	Number of Graduates, in 1906, Involved in the Comparison
0– .29	1.07	453
.30– .49	.89	609
.50– .69	.96	2,321
.70– .89	1.00	2,483
.90–1.09	1.18	1,584
1.10–1.29	1.41	1,193
1.30–1.49	1.33	745
1.50–1.69	1.28	740
1.70–1.99	1.53	622
2.00 and over	.925	976
Under .70	**.96**	**3,383**
1.30 and over	**1.22**	**3,083**
0– .70	**.96**	
.70–1.29	**1.135**	
1.30–1.99	**1.36**	
2.00 and over	**.925**	

TABLE 44

THE RELATION OF CHANGES IN THE SEX BALANCE OF THE STAFF TO CHANGES IN THE SEX BALANCE OF THE STUDENT BODY AND GRADUATES. SUMMARY OF ADDITIONAL DATA.

	M. T. '06 ÷ F. T. '06 / M. T. '96 ÷ F. T. '96	M. S. '06 ÷ F. S. '06 / M. S. '96 ÷ F. S. '96	M. G. '06 ÷ F. G. '06 / M. G. '96 ÷ F. G. '96
Schools of 10 and 11 teachers in '06.	0– .95	.97	1.02
	.96–∞	1.10	1.215
Schools of 6 teachers in '96.	0– .70	.91	.93
	.70– .99	1.13	.81
	1.00–1.49	1.085	1.055
	1.50–∞	1.08	1.12
Massachusetts schools of 4, 5 or 6 teachers in '96.	0– .99	1.05	.85
	1.00–∞	1.05	.77

Taking all these facts together, it seems safe to say that in these larger schools changes of staff expressed by the ratios .50 and 2.00 (for instance, a change from 5 men and 5 women to 5 men and 10 women or from 5 men and 5 women to 10 men and 5 women) are not accompanied by corresponding changes in the student body of much more than 5 minus or plus (for instance, from 100 boys and 100 girls to 100 boys and 105 girls and to 105 boys and 100 girls.

In the case of the graduates the figures for similar changes in staff would be perhaps 7 plus or minus.

The possible influence of men teachers in attracting boys and holding them through the high school course, the possible influence of a habit of letting the sex balance of a school count as a reason for choosing a new teacher from one sex rather than the other, the influence of the addition of studies specialized for the sexes (such as manual training and domestic science) which, so far, are taught almost exclusively *by* the same sex that they are taught *to*, and other similar influences, have not all together been strong enough to account for more than a small fraction of the very great changes in the sex balance of these high schools. The influence first named must certainly have been very slight, for the one last named is real and must have been the cause of part of the slight correlation found.

The measurements made are perhaps even more interesting from other points of view than that of the attempt to verify or refute the opinion that replacing women teachers by men would help largely to turn the sex balance in our secondary schools.

As the author has in several instances shown, the variability of our schools, cities, states, and institutions in respect to different features of educational work is very instructive. It is in the present case. Taking such high schools as are in each case the only public secondary schools in the city or town and should do,

therefore, the general work of secondary education for the community, we find that for medium sized and large schools the percentage of male teachers varies from 0 to 75 and over. Are the extremes justifiable, each really adapted to the special needs of that community, or are they due to ignorance and caprice? We find that some schools have only half as high a percentage of boys as do others. Is this because the boys in these communities need education less, or because poverty debars boys from school so much more than girls, or because of an unwise administration of the school? If poverty does debar boys in excess, ought it to? We find that from '96 to '06 some cities have vastly increased the proportion of women on their high school staffs while others have vastly increased the proportion of men. Were both right because of local needs? Which group was right? Were perhaps both groups wrong?

We are not, at present, able to judge the worth of the feminization of secondary and higher education from its results. There is an intellectual difficulty in the absence of facts and an emotional difficulty in the presence of prejudices. But we could in part judge it by its relations—by what it goes with. And since a student of education who has got the ability to measure variable relationships commonly has had sufficient scientific experience to elevate him above conventional prejudices, this method might well be more impartially used than the direct method. The following questions can all be answered by energy and care: How do the most feminized and the most rapidly being feminized schools stand, in comparison with their opposites (in both present condition and recent progress), with respect to cost per pupil, number of teachers per hundred pupils, per cent of population enrolled, course of study, laboratory, library, and technical equipment, and other symptoms of efficiency? How do the communities in which they are stand (in both present condition and recent progress) with respect to public health protection, street lighting,

infant mortality, parks and libraries, provision of kindergartens and evening schools, crime, and the like?

Finally I may call attention to the fact that comparative studies of the changes in the school work of individual cities during the past ten, twenty, or thirty years are likely to be even more instructive than the comparisons of present status to which we have been accustomed to confine our attention. The latter portion of the present article is, I believe, the first attempt to use on a large scale the statistics of educational changes measured separately for each city or other educational unit.

Only those schools were taken which were co-educational, and which represented the entire system of public secondary education in the community. There were 204 in all, so that the comparison concerns roughly the top and bottom fifths with respect to the sex balance of the staff. The same method is available for far more important problems than that of the sex balance in schools. It should be applied to all administrative problems. An apparent lack of change in the country as a whole may be the result of enormous, but opposite, changes in different localities or institutions; and, of course, apparent general change in one direction may conceal similar enormous individual differences. By individualizing the measurements of change for different features of educational practice and correlating them, we may learn vastly more of their nature, and, under certain conditions, of their value.

PART III

STUDIES OF THE ORGANIZATION OF SCHOOLS AND COURSES OF STUDY

§ 14. The Elementary School Curriculum

The ends which we seek in education are realized by means of the curriculum, the methods of instruction and the organization and management of our schools. When schools were concerned primarily with the three R's, education was largely a matter of experience received outside of the schoolroom. It was inevitable that with the changed social conditions, the content of the school curriculum should be greatly increased. That the curriculum is the result of a demand originating outside of the teaching profession is shown clearly in Professor W. A. Jessup's "Social Factors Affecting Special Supervision." A part of his concluding statement follows:

"We have seen that the pressure which brought about the introduction of music was generated by the organization of public sentiment by people outside the school. The rapid introduction of drawing was traced to the influence of the public opinion directed by the manufacturers of Massachusetts and elsewhere. Economic and humanitarian forces united in consciously creating a pressure which resulted in the introduction of manual training and domestic science. The sudden rise in interest in physical education in the early nineties was traced to the organized activities of the German Turners, the Christian Associations and private munificence. While penmanship had a special value within the schoolroom, it did not take its place as a *sine qua non* until pressure was brought to bear from outside agitation.

"All of this is a striking commentary on the character of the school as a public institution and on its responsiveness to public opinion and certainly points clearly to the conclusion that these modifications in the curriculum have largely come from without

rather than from within the school group. The administrator who aspires to genuine leadership in school affairs surely cannot afford to neglect the conscious organization of public sentiment as one of his most powerful means of attainment of ends. The school is being constantly subjected to outside pressure and the superintendent must either yield to these forces or direct them. It is true that the factor of imitation has been operative in the later introduction so that in many cases the desire to be 'abreast of the times' has brought about the introduction of new subject matter irrespective of the fact that there was neither a public demand for this nor a clear conception of the purpose involved. However, since this refers to the later development, it does not affect the conclusions above. . . .

"We have seen the organized efforts of the Boston Academy of Music; the petition of the Massachusetts manufacturers, urging legislation relative to drawing, the New York Industrial Education Association spreading the propaganda for manual training and domestic science; the German Turners and others putting forth the claims for physical education. We have likewise noted that in almost every instance the expense of the initial experiment was borne by these organizations. After a further preparation of the public mind and proving the possibility of the venture, the second step was to effect joint control between the advocates of the new movement and the regular school authorities, followed by the complete adoption at public expense. In view of the facts presented in this study it would seem quite possible to introduce almost anything into the schools provided a few influential people became sufficiently interested to furnish the necessary funds for the development of public sentiment. This plan has met with uniform success in the past irrespective of the subject involved or the size of the city."

We are to-day adding industrial training to our curriculum beyond the sixth year and again the demand has come largely

from those who employ skilled labor. The current agitation for religious and moral training is due primarily to the fact that the church and the home are doing less for children in this field and that parents and religious leaders are hoping that the school will be able to make good this deficiency.

Along with the increase in the content of the curriculum has come the cry of "fads and frills" from those who see little significance in those aspects of school work which are not directly related to making a living. A more significant criticism, current among teachers and other careful students of education, declares that the curriculum is overcrowded. More time is needed for the more comprehensive training which the school attempts to give to-day. The curriculum is overcrowded largely because we are attempting to give *in school* in a five hour day the training which once occupied the greater part of the child's waking hours. The longer school day has already been introduced in many industrial schools which have the eight hour day. We may expect that a school which attempts to teach the three R's, geography, history, nature study, music, drawing, industrial and household arts and which plans at the same time to be responsible for the recreation of children will demand more than five hours a day.

The problem of the curriculum is not simply, What shall be included in the curriculum? but also, When shall each subject be begun and what part of the subject shall be assigned to each of the grades in which it is found? and, How much time shall be devoted to each subject in each grade? Dr. Bruce R. Payne's ['05] careful investigation of "Elementary School Curricula[1]" contains interesting data, a part of which is presented in the tables taken from his book presented below.[1]

[1] Payne, B. R., "Public Elementary School Curricula" published by Silver, Burdett and Company.

TABLE 45

THE PERCENTAGE OF TOTAL TIME GIVEN TO EACH STUDY IN THE PUBLIC ELEMENTARY SCHOOLS OF TEN AMERICAN CITIES

	Boston	Chicago	Cleveland	Columbus, Ga.	Jersey City	Kansas City	Louisville	New Orleans	New York	San Francisco	Average
1 Opening Exercises	2.9	1.6	1.7	5.1	3.7	1	1.9	1.5	5.7	4.4	3.1
2 Reading and Literature	23.3	18.8	23.6	16.9	30	14.5	23.9	13.4	[1]	20.2	20.7
3 Writing	[1]	4.8	5.4	4.1	6.8	9.6	4.6	4.1	5.5	5.1	4.7
4 Spelling	2.4	3.3	5.6	6.3	[2]	10.7	5.7	5.1	2.9	7.2	4.7
5 Grammar											
6 Language											
7 Composition	17.7	11.9	16.1	18.1	10.3	11.1	12.5	17.6	30.9	13.7	14.4
8 Arithmetic	16.2	18.6	17.3	18.6	19.5	15.1	17.2	18.6	12	15.3	17.3
9 Geography	5.5	6.1	6.2	10.7	6.7	7.5	9.8	8.9	4.3	6.9	7.2
10 History											
11 Civil Government	3.6	4.7	3	3.7	3.6	6.6	4	5.7	4.3	6.6	4.8
13 Elementary Science											
14 Nature Study	4.5	6.2	1.4		3	3.1	2.7	4.5	5.6	3.9	3.4
15 Physiology			2.3		[2]		.7	1.7	2	[3]	.7
16 Physical Training	6	3.3	3.5				2.4	3.6	8	4.1	4.7
17 Drawing	7.1	4.8	5	4.2	6.4	11.5	6.4	4.1	9.6	5	6.4
18 Music	4.3	4.9	4.9	4.3	3.9	10.6	5.5	4.3	4.6	5.3	5.1
19 Manual Training [4]	5.8	1.5	2.3	4.4					5.4	4	2.4

[1] Included with language.
[2] Included with reading.
[3] Included with nature study.
[4] Includes cooking and sewing.

TABLE 46

THE AVERAGE TIME IN MINUTES PER WEEK GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN AMERICAN CITIES

Grade	I	II	III	IV	V	VI	VII	VIII
1 Opening Exercises	43	43	43	40	40	40	40	40
2 Reading and Literature	443	404	367	373	232	160	142	129
3 Writing	80	78	91	79	62	62	28	22
4 Spelling	47	90	81	73	67	62	44	33
5 Grammar								
6 Language and								
7 Composition	130	146	144	158	176	224	254	256
8 Arithmetic	161	195	232	239	241	249	242	231
9 Geography	11	20	53	156	164	150	127	81
10 History and								
11 Civil Government	5	5	5	17	41	171	152	160
13 Elementary Science and								
14 Nature Study	35	35	34	46	51	44	58	49
15 Physiology	7	7	8	8	13	13	8	8
16 Physical Training	52	49	50	49	42	37	37	37
17 Drawing	75	85	88	82	86	92	78	77
18 Music	67	71	68	68	67	67	64	64
19 Manual Training	16	18	19	33	30	30	50	50
Total Assignments	1174	1250	1285	1401	1313	1404	1327	1245

THE AVERAGE PERCENTAGE OF RECITATION TIME GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN AMERICAN CITIES

1 Opening Exercises	3.6	3.4	3.4	3.5	2.9	2.9	2.9	2.9
2 Reading and Literature	37.3	31.8	28.7	20.6	17	12.2	10.4	9.5
3 Writing	6.7	6.1	7.1	5.9	4.5	4.5	2	1.6
4 Spelling	3.9	7.1	6.3	5.5	4.9	4.6	3.2	2.4
5 Grammar								
6 Language and								
7 Composition	10.9	10.1	10.1	10.1	10.2	16.5	18.6	18.8
8 Arithmetic	13.6	15.4	18.2	18	17.6	18.3	17.7	17
9 Geography	.9	1.5	4.1	11.8	12	11.1	9.3	5.9
10 History, etc	.4	.4	.4	1.2	3	5.2	11.1	12
13 Elementary Science, etc	2.9	2.8	2.6	3.4	3.7	3.2	4.2	3.6
15 Physiology	.5	.6	.6	.6	.9	.9	.6	.6
16 Physical Training	4.3	3.9	3.9	3.7	3	2.7	2.7	2.7
17 Drawing	6.3	6.9	6.8	6.1	6.2	6.7	5.7	5.6
18 Music	5.6	5.6	5.3	5.1	4.9	4.9	4.6	4.7
19 Manual Training	1.3	1.4	1.4	2.5	2.1	2.2	3.6	8.6

TABLE 47

THE CURRICULUM OF THE PUBLIC ELEMENTARY SCHOOLS OF NEW YORK CITY FOR THE YEARS 1868, 1888 AND 1904; ALSO THE PERCENTAGE OF TOTAL TIME DEVOTED TO EACH SUBJECT FOR THE YEARS 1888 AND 1904

Grade	1868							1888									1904								
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	Pct.	1	2	3	4	5	6	7	8	Pct.
1 Opening Exercises Morals & Manners	x	x	x	x														75	75	75	75	75	75	75	75	5.8
2 Reading	x	x	x	x	x	x	x	x	a	a	a	a	a	a	a	a	a	b	b	b	b	b	b	b	b	
3 Writing	x	x	x	x	x	x	x	x	120	120	120	120	120	120	120	120	15.5	100	125	125	75	75	75			5.5
4 Spelling	x	x	x	x	x	x	x	x	a	a	a	a	a	a	a	a	a	b	b	b	b	b	b	b	b	
5 Grammar						x	x	x	360	360	360	300	300	300	300	300	41.6	b	b	b	b	b	b	b	b	
6 Language									a	a	a	a	a	a	a	a		450	510	450	375	375	375	360	320	30.9
7 Composition								x	a	a	a	a	a	a	a	a		b	b	b	b	b	b	b	b	
8 Arithmetic	x	x	x	x	x	x	x	x	240	240	240	180	180	180	180	180	26.2	120	150	150	150	150	200	160	160	12
9 Geography				x	x	x	x	x			60	60	40	40			2.7				135	120	120	80		4.3
10 History							x	x				40	40	40	40		2.5					90	120	120	120	4.3
11 Civics												c	c	c	c							c	c	c	c	
12 Object Lessons	x	x	x	x	x	x	x																			
13 Elementary Science	x	x	x																					80	80	1.5
14 Nature Study																		90	90	90	75					4.2
16 Physiology & Hygiene, Physical Training																		210	165	165	165	90	90	90	90	10
17 Drawing									30	30	30	40	40	40	40	40	4.7	160	160	160	120	120	120	80	80	9.6
18 Music									25	25	25	50	50	50	50	50	5.2	60	60	60	60	60	60			4.6
19 Manual Training, Cooking & Sewing																								80	80	1.9
21 Punctuation	x	x	x	x														60	60	60	60	60	60			4.62
23 Foreign Language or Stenography																									200	1.9
Total									775	775	835	770	770	770	730	690		1,315	1,395	1,335	1,305	1,290	1,295	1,225	1,265	

The presence of any letter in the above columns signifies that the subject was taught in that particular grade and year.

(a) Language in 1888 includes reading, spelling, and grammar. (b) Language in 1904 includes reading, spelling, memorizing, composition, and grammar. (c) In 1888 and 1904, history includes civics.

Table for the year 1868 compiled from Barnard's American Journal of Education, pp. 469–576; for 1888 from U. S. Commissioner's Report, 1888–89, Vol. I., pp. 369–411. Tables 20, 21, 22, 23, for years 1868 and 1888 are made from same sources.

TABLE 48

THE CURRICULUM OF THE PUBLIC ELEMENTARY SCHOOLS OF ST. LOUIS FOR THE YEARS 1868, 1888 AND 1904; ALSO THE PERCENTAGE OF TOTAL TIME DEVOTED TO EACH SUBJECT FOR THE YEARS 1888 AND 1904

GRADE	1868							1888									1904								
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	8	Pct.	1	2	3	4	5	6	7	8	Pct.
1 Opening Exercises																									
Morals and Manners										30	30	30	30			.9	20	25	25	30	30	30	30	30	3.9
2 Reading	x	x	x	x	x	x	x	650	660	350	300	300	300	180	180	25	400	250	125	150	120	120	90	90	16.
3 Writing		x	x	x	x	x	x	100	125	125	120	120	120	90	90	7.1	100	125	125	125	125	120	90	90	12.
4 Spelling			x	x	x			200	100	150	150	150	150	150	150	10.3		150	75	75	60	60	30	30	6.5
5 Grammar							x							240	240	4.1									
6 Language								60	75	75	90	90	90				40	50	75	60	60	60	90	120	7.6
Declamation				x	x	x	x																		
8 Arithmetic	x	x	x	x	x	x	x	200	250	300	600	300	300	300	300	19.3	100	125	150	150	150	150	150	150	15.2
9 Geography				x	x	x	x			150	180	180	180	180	180	8.9			100	120	120	120	120	120	9.5
10 History							x			50	30	30	90	30	30	1.7							90	150	3.2
11 Civics																									
13 Elementary Science								20	30	50	60	60	60	30	30	2.9									
14 Nature Study																	20	25	25	30	30	30	30	30	3.1
16 Physical Training	x	x	x	x	x	x	x	50	50	50	50	50	50	50	50	4.3	50	50	50	50	50	50	50	50	5.4
17 Drawing								100	100	100	100	90	90	90	90	6.5	100	100	100	90	90	90	90	90	10.
18 Singing	x	x	x	x	x	x	x	70	65	75	80	80	80	80	80	5.2	15	25	25	30	30	30	30	30	3.
23 German												x	x	x	x										
Total								1,450	1,445	1,505	1,790	1,480	1,540	1,420	1,420		845	925	875	910	865	860	890	980	

TABLE 49

THE AVERAGE RECITATION TIME IN MINUTES PER WEEK DEVOTED TO EACH SUBJECT IN EACH GRADE (OR STANDARD) IN TEN CITIES OF ENGLAND

Grade	I	II	III	IV	V	VI	VII	VIII	Pct.
1 Scripture	155	155	156	156	156	156	156	156	11.4
2 Reading	210	206	181	154	140	127	108	76	11.1
3 Writing	123	91	85	78	69	62	73	70	6
4 Spelling	66	85	60	58	43	39	33	5	3.57
5 Grammar	42	49	66	67	67	70	67	65	4.5
6 Recitation or Literature	52	57	56	53	54	53	50	95	4.2
7 Composition	43	52	61	54	85	99	72	25	4.5
8 Arithmetic	267	266	276	308	294	293	257	231	20.1
Algebra	3	3	3	5	13	35	61	136	2.38
9 Geography	53	64	80	91	87	88	70	97	5.7
10 History	32	38	37	42	40	40	34	58	2.9
12 Object Lessons									
13 Elementary Science									
14 Nature Study	62	61	55	44	40	41	46	92	4
16 Physical Training	48	49	52	42	46	43	29	30	3.1
17 Drawing	115	125	125	127	127	130	121	95	8.8
18 Singing	64	64	64	64	67	67	65	70	4.8
19 Wood-work	8	16	19	18	50	61	71		2.1
20 Needle-work	(103)	(103)	(106)	(106)	(107)	(106)	(126)	(157)	(8.3)
21 Cooking	(14)	(14)	(14)	(12)	(12)	(12)	(12)		(.8)
22 French	4	4	2	2	2	29	36	47	1.1
Total	1,347	1,369	1,361	1,359	1,380	1,433	1,359	1,338	

THE AVERAGE PERCENTAGE OF RECITATION TIME GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN CITIES OF ENGLAND

1 Scripture	11.5	11.3	11.5	11.5	11.3	10.9	11.5	11.7	
2 Reading	15.6	15.1	13.3	11.3	10.2	8.9	7.9	5.7	
3 Writing	8.9	6.7	6.3	5.8	4.9	4.4	5.4	5.2	
4 Spelling	4.9	6.2	4.4	4.3	3.1	2.7	2.4	.4	
5 Grammar	3.1	3.6	4.9	4.9	4.9	4.9	4.9	4.9	
6 Recitation or Literature	3.9	3.7	3.7	3.9	3.9	3.7	3.7	7.1	
7 Composition	3.2	3.8	4.5	3.9	6.2	6.9	5.3	1.9	
8 Arithmetic	19.8	19.4	19.9	22.7	21.3	20.5	18.9	16.5	
Algebra	.2	.2	1.2	.4	.9	2.5	4.5	10.2	
9 Geography	3.9	4.7	5.9	6.7	6.3	6.2	5.2	9.3	
10 History	2.4	2.8	2.7	3.1	3.9	2.8	3.4	6.9	
13 Elementary Science, etc.	4.6	4.5	4.1	3.3	3.9	2.8	3.4	6.9	
16 Physical Training	3.6	3.6	3.8	3.1	3.4	3	2.2	2.9	
17 Drawing	8.5	9.1	9.2	9.4	9.2	9.1	8.9	7.1	
18 Singing	4.8	4.6	4.7	4.7	4.9	4.7	4.8	5.2	
19 Wood-work	.6	1.2	.9	.9	3.6	4.3	5.2		
20 Needle-work	(7.7)	(7.5)	(7.8)	(7.8)	(7.8)	(7.4)	(9.3)	(10)	
21 Cooking	(1.1)	(.9)	(1.1)	(.9)	(.9)	(.9)	(.9)		
22 French	.3	.3	.1	.1	.1	1.9	2.7	3.5	

TABLE 50

THE PERCENTAGE OF TOTAL TIME GIVEN TO EACH SUBJECT IN TEN CITIES OF ENGLAND

SUBJECTS	London	Manchester	West Ham.	Bolton	Norwich	Carlisle	West Hartlepool	Newcastle	Wellingborough	Castleford	Average Pct.
1 Scripture	11.8	18.9	12.1	13.2	10.5	2.5	11.7	12	13.1	4.9	11.1
2 Reading	11.4	11	12.4	12.9	9.5	13.1	10.7	11.9	7.8	17.4	11.1
3 Writing	6	5.9	3.1	10.1	3.6	5.6	6.6	10.6	2.3	4	6
4 Spelling	1.3	3.1	2.1		6.2	6.5		3.3	2.3	6.9	3.5
5 Grammar	5.5	5.9	2.5	5.2	4.1	5.3		7.3	3.1	4	4.5
6 Recitation, Literature	3.3	2.5	2.7	3	2.5	5.4	9.4	2.7	4.5	3	4.2
7 Composition	4	2.6	2	1.7	14.3	7.1		4.6	5.8	4.8	4.5
8 Arithmetic	15.8	16.6	24	16.8	15	23.9	26 3	18.5	24 8	22.7	20.1
Algebra	3.1	2.7	.7	1.1			3.5				2.3
9 Geography	6.3	6.6	4.5	5.4	5.1	5.7		6.4	8	7	5.9
10 History	4.4		2.8	1.2	2.9	4.8	4.2		5.5	2	2.9
12 Object Lessons	4.3	2.8			2.6			4.3	3.4	in. st'y	}
13 Elementary Science			2.4	3.6			9.6			4	} 4
16 Physical Training	4	4.5	2.4	4	2.3	5.4		4.1	4.5	4	3.1
17 Drawing	9.6	7.9	7	8	9	9	11.3	8.2	11.9	10	8.8
18 Singing	4	4.5	4.8	3.4	4	5.4	6.6	6.2	3.8	4.9	4.8
19 Wood-work	2.4	3		1.2	4.6				3.1		2.1
20 Needle-work	(5.4)	(8)	(11.4)	(8.7)			(22.6)		(11.9)	(10.7)	(8.3)
21 Cooking										5.4	.8
22 French	2.3										
Examination of Home Work					3.2						
Varied Occupations			2.3								
Domestic Economy			3.3								

TABLE 51

THE AVERAGE RECITATION TIME IN MINUTES PER WEEK GIVEN TO EACH SUBJECT IN EACH GRADE IN THE TEN GERMAN CITIES

	Grade	I	II	III	IV	V	VI	VII	VIII
1	Religion	172	199	207	234	246	246	234	218
6	Language 1	588	603	600	567	513	501	583	472
8	Arithmetic	252	282	282	282	270	270	270	255
9	Geography	58	47	113	115	111	111	134	147
10	History			33	60	103	103	110	120
14	Nature Study			80	66	100	140	126	111
16	Gymnastics	54	36	60	108	132	132	132	125
17	Drawing	12	42	54	60	120	114	137	128
18	Singing	54	54	93	99	93	93	99	90
20	Handwork	(96)	(132)	(222)	(234)	(258)	(246)	(258)	(278)
	Geometry				18	42	72	102	112
	Total	1,190	1,263	1,502	1,609	1,730	1,782	1,822	1,788

SHOWING THE AVERAGE PERCENTAGE OF RECITATION TIME GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN GERMAN CITIES

1	Religion	14.5	15.8	13.8	14.6	14.2	13.8	13	12.3
6	Language	49.4	47.8	40	35.3	29.7	28.2	26.5	26.5
8	Arithmetic	21.2	22.3	18.7	17.6	15.6	15.2	15.2	15.3
9	Geography	4.9	3.7	7.5	7.2	6.4	6.3	7.4	8.3
10	History			2.2	3.8	6	5.8	6	6.8
14	Nature Study			5.3	4	5.8	7.9	7	6.2
16	Gymnastics	4.6	2.8	4	6.7	7.6	7.4	7.3	7.6
17	Drawing	1	3.3	3.6	3.8	7	6.4	7.3	7.2
18	Singing	4.6	4.3	6.2	6.2	5.4	5.2	5.4	5
20	Handwork	(7.3)	(9.3)	(13.6)	(13.5)	(14.2)	(13.4)	(14)	(13.5)
	Geometry				1	2.4	4.1	5.6	6.5

1 Language includes reading, writing, spelling, literature and composition.

TABLE 52

THE PERCENTAGE OF TOTAL TIME GIVEN TO EACH SUBJECT IN TEN GERMAN CITIES

	Berlin	Königsburg	Gottingen	Wiesbaden	Dresden	Munich	Würtzburg	Stuttgart	Karlsruhe	Hamburg	Average Pct.
1 Religion	13.3	14.7	13.4	13.8	13.9	9.7	20	18.6	11	7.5	14
6 Language[1]	28.8	32.1	33.6	39	31.4	38.5	34.8	37	37.6	30	34.2
8 Arithmetic	14.6	14.7	14.7	15.3	16.3	22.8	20	17	19.7	15.5	17.2
9 Geography	4.5	5.5	5.1	9.8	14.6	3.8	6.7	13.6[2]	5	5	6.6
10 History	4.5	5.5	4.7	3.9	4.7	3.8	2.6		2.3	4.6	4.2
12 Object Lessons			4.3			5.4					
14 Nature Study	9.6	5.5	4.5	3.9			4.1		3.6	8.3	5
16 Gymnastics	7.3	5.5	8.6	3.9	5.9	7.5	4.7	4.6	5	6.1	6.2
17 Drawing	6	6	5.6	1.8	5.6	5.4	3.5	3.7	6.4	6.6	5.2
18 Singing	6.4	6.8	6	5.4	4.9	3.8	4.1	4.4	6.4	6.1	5.3
20 Hand-work for Girls	(8)	(11)	(11.4)	(10.6)	(13.3)	(11)	(10.5)	(12)	(16)	(18.2)	(13
Geometry	4	3.6	2.6	2.4	2.9				2.7	3.4	2.7
English										7.5	

[1] Language includes reading, writing, spelling, grammar and composition.
[2] Includes history, object lessons and nature study.

An interesting comparison with Dr. Payne's data is made possible by the figures published in the report of the commission appointed to study the system of Education in the Public Schools of Baltimore.[1] These results from the larger cities of the country showing a wide variability are representative of the prevailing practice in city school systems of smaller size as well.

"The following table shows the percentage of school time allotted in the suggested schedules to the subjects that are generally called the essentials, namely, English, including reading, writing, spelling, and language; arithmetic, geography, and history, which are here designated as the 'old' subjects. Similar allotments in certain other subjects are also shown, which are here designated as 'new' subjects, such as drawing, manual training, etc."

TABLE 53

PERCENTAGE OF SCHOOL TIME DEVOTED TO OLD SUBJECTS AND NEW SUBJECTS

CITIES	Old Subjects	New Subjects	CITIES	Old Subjects	New Subjects
New York.....	62.48	37.52	Baltimore.....	77.90	22.10
Chicago.....	52.60	47.40	Pittsburg.....	81.00	19.00
Philadelphia....	67.60	32.40	Detroit.....	83.80	16.20
St. Louis.....	70.87	29.13	San Francisco..	79.90	20.10
Boston.....	73.36	26.64	Milwaukee.....	75.45	24.55
Cleveland.....	79.55	20.45	Cincinnati.....	76.69	23.31

[1] U. S. Bureau of Education, Bulletin No. 4. 1911.

TABLE 54

THE MINUTES PER WEEK DEVOTED TO THE STUDY OF ARITHMETIC AND ALGEBRA IN CERTAIN CITIES (1911)

CITIES	YEAR								TOTAL
	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	
New York. . .	125	150	150	150	150	200	200	200	1,325
Chicago.		150	200	250	150	150	150	150	1,200
Philadelphia.	150	200	200	200	225	225	225	225	1,650
St. Louis	100	125	150	150	150	150	150	150	1,125
Boston.	25	210	210	270	270	230	210	210	1,635
Cleveland . . .	60	200	250	250	250	250	300	300	1,860
Baltimore . .	250	200	200	200	250	250	275	275	1,900
Pittsburg . . .	60	120	180	200	200	240	300	360	1,660
Detroit	75	150	200	225	250	250	275	275	1,775
San Francisco	150	150	150	200	250	250	250	250	1,650
Milwaukee . .	75	100	150	175	175	200	200	212	1,287
Cincinnati. . .	150	250	240	240	240	300	300	360	2,080

TABLE 55

THE PERCENTAGE OF SCHOOL TIME EXCLUSIVE OF RECESSES AND OPENING EXERCISES DEVOTED TO THE STUDY OF ARITHMETIC AND ALGEBRA IN THE GRADES, IN 1890 AND IN 1910–11, IN CERTAIN CITIES

CITIES	YEAR		CITIES	YEAR	
	1890	1910–11		1890	1910–11
New York.	26.2	13.4	Detroit	17.2	16.0
Chicago.	9.3	10.0	Buffalo		
Philadelphia. . . .		16.1	San Francisco	14.0	16.6
St. Louis.	19.3	15.0	Milwaukee.	15.5	14.7
Boston.	16.6	15.5	Cincinnati	13.4	18.8
Cleveland	14.1	15.5			
Baltimore	19.5	18.3	Average	16.5	15.8
Pittsburg.		18.0			

TABLE 56

THE YEAR OF THE COURSE IN WHICH SPECIFIED TOPICS IN ARITHMETIC ARE TREATED IN THE CERTAIN CITIES

CITIES	45 Combinations Learned	Multiplication Tables Learned	Long Division Taught	Addition and Subtraction of Fractions Taught	Multiplication and Division of Fractions Taught	Decimals Taught	Percentage Taught
New York	2	3	3	4	5	5	6
Chicago	2	4	4	5	5	6	6
Philadelphia	2	2	3	5	5	6	6
St. Louis	2	3	4	3	4	4	5
Boston	2	4	4	5	6	5	6
Cleveland	2	4	4	5	6	5	6
Baltimore	2	3	4	3	4	4	6
Pittsburg	2	3	4	4	5	5	6
Detroit	2	3	4	4	5	5	6
Buffalo	2	3	4	5	5	5	6
San Francisco	2	3	4	4	5	4	6
Milwaukee	4	4	4	5	5	6	7
Cincinnati	2	3	3	4	5	4	6

TABLE 57

THE PERCENTAGE OF THE SCHOOL TIME, EXCLUSIVE OF OPENING EXERCISES AND RECESSES, DEVOTED TO THE STUDY OF GEOGRAPHY IN VARIOUS CITIES IN 1890 AND IN 1910–11

CITIES	1890	1910–11	CITIES	1890	1910–11
New York	2.7	6.2	Detroit	8.6	8.2
Chicago	4.9	4.4	Buffalo	[1]	
Philadelphia		7.0	San Francisco	8.9	7.5
St. Louis	8.9	7.3	Milwaukee	6.0	6.7
Boston	6.8	6.2	Cincinnati	6.5	6.1
Cleveland	6.9	7.2			
Baltimore	6.3	11.0	Average	6.55	7.23
Pittsburg		9.0			

[1] No data at hand.

TABLE 58

THE PERCENTAGE OF TIME DEVOTED TO MANUAL TRAINING IN CERTAIN CITIES IN 1910–11

CITY	PERCENTAGE	CITY	PERCENTAGE
New York	4.7	Pittsburg	5
Chicago	9.9	Detroit	1.4
Philadelphia	3.5	Buffalo	[1]
St. Louis	2.4	San Francisco	1.8
Boston	6.2	Milwaukee	6.2
Cleveland	4.8	Cincinnati	2.2
Baltimore	5.3		

Doubtless the variation found in the time allotted to the various subjects is due in some degree to a corresponding difference in emphasis upon the subject in question, *i. e.* a difference in the product expected. There is no doubt but that a single school system with a reputation for good work influences many others. Much must be allowed for tradition and something for a passing demand which leads now and again to additional emphasis on this or that subject.

A scientific allotment of time and organization of the course of study will be possible only when we define more accurately the ends which we desire and perfect the scales or units of measurement which we apply in measuring results in education. We will concern ourselves with certain optima the resultants of time devoted to the given subject and the product secured. The optimum in a subject like arithmetic or handwriting will be thought of in terms of three variables, the amount and distribution of time, the product in terms of accuracy or form, and the speed with which the given result is achieved. If we can determine that a certain standard of form is desirable in penmanship and that the pupil must be able to produce these forms at a certain speed, we can then experiment with the amount and distri-

[1] No data at hand.

bution of time with a definite goal in view. When such experiments are undertaken, it will be necessary to allow for individual differences. Possibly our standards may be expressed in terms of the accomplishment of the median individual and in terms of the variability from this central tendency.

§ 15. Size of School as a Conditioning Factor in Secondary Education [1]

The most typical, in the sense of the most frequent, secondary school in the United States is a school taught by one teacher. The secondary schools in the country with only one teacher outnumber by a considerable figure all those with five or more teachers. Those with only one or two teachers outnumber by a considerable figure all the rest. Those with one, two, or three teachers are ten times as frequent as those with ten or more teachers and five times as frequent as those with from five up to ten teachers.

Of course the fact that the one-teacher school is much the most frequent does not mean that a secondary school student will most frequently attend a one-teacher school. The typical secondary school education in the sense of the sort of secondary education most commonly given need not be that given in a one-teacher school. Still the frequency of the schools of small teaching force is so much greater that in spite of the large registration of city high schools there are more pupils in the two-teacher high schools than in any other one group, unless, perhaps, the three-teacher schools, and more in schools with three teachers or less than in schools of from five to thirteen teachers, and nearly if not quite as many as in schools of fifteen or more teachers.

The printed discussions of secondary school problems seem to have in view to a large degree a school of six to twelve teachers with two or three hundred pupils. The report of the Committee of Ten strikes one as unconsciously based upon the acceptance of some such quantity as typical for secondary schools. It is

[1] This section is quoted with slight alterations from an article entitled "A Neglected Aspect of the American High School," by Edward L. Thorndike, which appeared in the *Educational Review* in March, 1907 (Vol. XXXIII, No. 3).

nowhere typical in any valuable sense, and is about as little typical as could be expected in Massachusetts. Schools of one or two teachers only are six times as frequent and enroll more pupils. Schools of twenty teachers or more enroll as many pupils. Either the district high school, as we may call the one- or two-teacher school, or the unlimited possibility high school, as we may call one that commands the services of twenty or more teachers, is a more important educational agency in this country than the six- to twelve-teacher high school.

The facts concerning the size of teaching staff and the size of student body, and consequently the opportunity for a varied program of studies, advanced instruction, periods of a half-hour's length, specialized equipment on the part of teachers and the like, are shown in Table 59 and Figure 22, which give the frequencies of different sizes of teaching staff for the country as a whole; and in Table 60 and Figure 23, which give roughly the frequencies of different sizes of student body.

These facts show that the high school is, like the "college," an institution of enormous variability as regards its capacity for educational work and its administrative and educational arrangements.

This variability has never been fully realized in the discussions of secondary school problems. The recommendations made are often utterly impossible of realization by the village high school and decidedly unwise for the unlimited possibility high school. The rule must in the nature of the case be that what is best for any one-fifth of high school effort is not the best for any other fifth. Because of historical reasons the village high schools and the schools of unlimited possibility have suffered most.

The one- or two-teacher high school has been confined to text-books made for class instruction in periods of thirty minutes or more. It has been led to attempt to teach chiefly foreign languages and mathematics, the subjects where close grading and

FIG. 22. Relative frequencies of public high schools of 1, 2, 3, 4, etc. teachers (1904.)

TABLE 59

Number of Teachers	Number of Public High Schools (1904)							Number of Teachers
	North Atlantic States	South Atlantic States	South Central States	North Central States	Western States	District of Columbia	Entire United States	
1	322	200	245	1,320	88	..	2,175	1
2	392	138	227	968	82	..	1,807	2
3	251	69	148	662	91	..	1,221	3
4	185	41	66	306	42	..	640	4
5	106	19	30	190	36	..	380	5
6	78	4	9	98	18	..	207	6
7	61	7	14	80	10	..	172	7
8	28	5	2	44	8	..	87	8
9	26	5	6	31	6	..	74	9
10	14	3	2	24	5	..	48	10
11	12	..	2	25	3	..	42	11
12	15	..	4	17	2	..	38	12
13	9	2	3	13	3	..	30	13
14	17	..	2	12	4	..	35	14
15	10	..	1	6	3	..	20	15
16	11	2	..	2	2	1	18	16
17	6	..	2	4	2	..	14	17
18	11	1	1	6	3	1	23	18
19	6	..	..	2	2	1	11	19
20	7	..	..	5	..	..	12	20
21	5	1	..	6	2	..	14	21
22	5	1	..	4	1	..	11	22
23	6	..	..	5	..	..	11	23
24	8	1	1	4	4	..	17	24
25	5	..	..	4	..	1	10	25
26	3	1	1	1	1	..	7	26
27	2	..	..	4	..	..	6	27
28	2	..	..	1	..	..	5	28
29	2	..	..	1	1	..	4	29
30	..	..	..	3	2	..	5	30
31	..	..	..	1	..	..	1	31
32	4	..	..	1	..	1	6	32
33	..	..	..	..	..	1	1	33
34	2	..	..	..	1	..	3	34
35	1	..	..	2	..	..	3	35
36	1	..	..	2	..	..	3	36
37	3	..	..	2	..	..	5	37
38	..	..	..	4	..	..	4	38
39	..	..	..	..	..	..	..	39
40	1	..	..	..	..	..	1	40
	Also seventeen schools of over 40 teachers 41– 50 5 51– 60 4 61– 70 2 71– 80 3 81– 90 1 91–100 0 101–109 2			Also eight schools of over 40 teachers 41–50 2 51–60 3 61–70 2 71–80 0 81–90 1	Also one each of 43 and 51 teachers	Also one of 45 teachers	Also twenty-eight over 40 teachers	

recitation methods are most necessary. It has been stigmatized for failure to maintain a four-year course or the pretense of one. The first two results are almost certainly unfortunate and the third is probably so. Text-books somewhat after the pattern used by the best correspondence schools would be much more efficient. By replacing four classes in Latin receiving only fifteen

TABLE 60

SHOWING THE APPROXIMATE PROPORTIONS OF THE PUBLIC HIGH SCHOOL ENROLLMENT OF THE UNITED STATES IN SCHOOLS OF FROM 1 TO 110 TEACHERS (1904)

	Number of Teachers		Students Enrolled			
In schools of	1– 3	teachers are	36.6	per cent of the	public high school	students
"	4– 6	"	22.1	"	"	"
"	7– 10	"	9.1	"	"	"
"	1– 10	"	68.6	"	"	"
"	11– 20	"	13.5	"	"	"
"	21– 30	"	7.7	"	"	"
"	31– 40	"	3.6	"	"	"
"	41– 50	"	2.0	"	"	"
"	51– 60	"	1.2	"	"	"
"	61– 70	"	1.0	"	"	"
"	71– 80	"	.8	"	"	"
"	81– 90	"	.7	"	"	"
"	91–100	"	.0	"	"	"
"	101–110	"	.8	"	"	"

minutes a day each by one class in English enrolling pupils of all four years and doing different work each year of a quadrennium, the teacher would have a class of size sufficient to arouse enthusiasm and mutual interests in the students, taught for a full forty-minute period daily, and still have twenty minutes daily to apply to the strengthening of other courses. The same result would be reached by making a quadrennium course in science, say biology, physics, chemistry, and agriculture.

To teach a four-year course poorly may for certain social reasons have advantages over teaching a two-year course twice as well, but in ultimate educational value it cannot be as good in the case of a one- or two-teacher high school. Pupils who are able to give the last two years to continued secondary education ought to be encouraged to go to a larger high school. It is not economical to try to fit the enormous variability of local educational endeavor to a scale so coarse as "elementary school,"

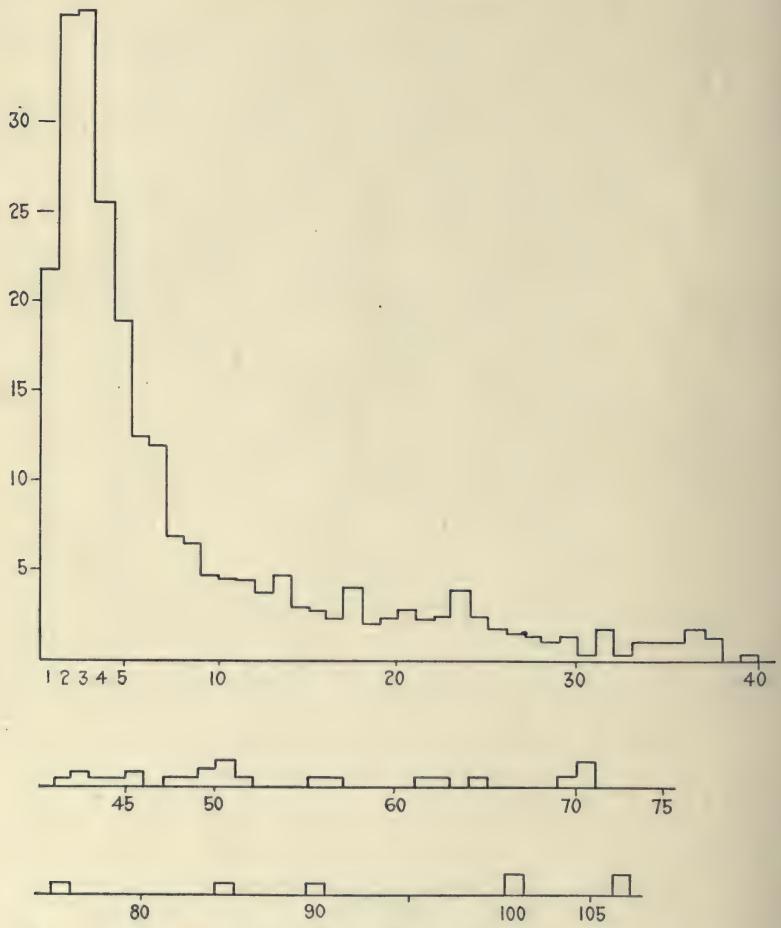


FIG. 23. The horizontal line is for the size of school (number of teachers): the heights give the approximate number of pupils enrolled, as measured by the number of thousands of teachers employed (1904).

"elementary school and high school," and "elementary school, high school, and college." We need two-year high schools as truly as four-year high schools. And we lower, not raise, edu-

cational standards by providing a four-year course for a high school with only one teacher to do its work.

An easy, but perhaps the wrong, solution for the village high school problem will rise in every one's mind—consolidation. The difficulties of consolidation are here of course far greater than in elementary schools. And consolidation theoretically should result not only in replacing one- and two-teacher high schools by four- or six-teacher schools, but also in replacing *no* high school by one- and two-teacher schools, giving us the same problem again. Into the details of this problem I shall not enter, as this article is intended to show the significance of statistics rather than to contribute to theories of administration. I venture, however, to correct one opinion which is demonstrably unjust to the village high schools, the opinion that they are the result of relatively low educational ideals.

The predominance of small over large high schools is by no means symptomatic of poor support of secondary education by a community. This fact is shown by Table 61, which gives the states ranked in order for the smallness of the proportion of secondary students enrolled in schools with only one, two or three teachers; and for the general support of secondary education as measured by the number of public high-school teachers per thousand of population. For example, Rhode Island, New Jersey and New York, though very free from the one- two- three-teacher high school, are near mediocrity in respect to degree of support, while Maine, Nebraska and South Dakota, though characterized by many small high schools, rank very high in degree of support of secondary education. Some of the states that are in the top fifth for the number of public high school teachers provided for one thousand of the population are distinctly village high school states. Nor do those states, such as California, Minnesota, and Wisconsin, which, though rural states, are exceptional in the low percentage of one- and two-teacher high schools, provide any bet-

TABLE 61

THE STATES RANKED IN ORDER BY THE SMALLNESS OF THE PROPORTION OF SECONDARY STUDENTS ENROLLED IN SCHOOLS WITH ONE, TWO OR THREE TEACHERS (COLUMN HEADED "SIZE OF SCHOOLS") AND BY THE NUMBER OF PUBLIC HIGH SCHOOL TEACHERS PER THOUSAND OF POPULATION (COLUMN HEADED "SUPPORT OF SCHOOLS"). DATA FOR 1904

	Size of Schools	Support of Schools		Size of Schools	Support of Schools
Rhode Island	1	21	Missouri	26	26
Massachusetts	2	1	Idaho	27	31
New Jersey	3	25	Ohio	28	10
New York	4	20	Indiana	29	5
Utah	5	31	W. Virginia	30	40
Colorado	6	3	Vermont	31	9
California	7	17½	No. Dakota	32	23
Connecticut	8	15½	Kansas	33	12
New Mexico [1]	9	36½	Arkansas	34	45
Illinois	10	22	Maine	35	4
Minnesota	11	19	Texas	36	29
Wisconsin	12	15½	So. Carolina	37	36½
Montana	13	13½	Mississippi	38	38½
New Hampshire	14	11	Nebraska	39	2
Maryland	15	34	Georgia	40	38½
Michigan	16	8	Oregon	41	24
Oklahoma	17	34	Wyoming	42	28
Washington	18	6½	Florida	43	34
Delaware	19	27	Tennessee	44	42
Iowa	20	6½	Alabama	45	45
Kentucky	21	42	So. Dakota	46	13½
Pennsylvania	22	31	Nevada	47	17½
Virginia	23	45			
Louisiana	24	42			
No. Carolina	25	47			

ter for secondary education than their neighbors Washington, Michigan, Indiana, and South Dakota, which have high percentages. The large cities often, perhaps usually, do not provide for secondary education so well as do the towns. For instance, San Francisco, Chicago, Philadelpha, and New York do not provide anywhere nearly so many public high school teachers per thou-

[1] Including Arizona also.

sand of population as their respective states do. A two-teacher high school in a town of two thousand may seem to the modern educator a rather despicable educational institution, but it means a provision for secondary education far, far above the average of any state and still farther above the average of all save a very few cities.

The high school of the large cities has suffered as truly. A school with thirty or more teachers might well aspire to approximate the ideal of big institutions where a boy or girl from thirteen to nineteen could learn anything that it was well for him at that age to know. A rich elective system, the provision of technical and semi-professional education, the opportunity for work of the continuation-school type during two or more forenoons a week, and many other flexibilities of adaptation of the school to its pupils' natures and needs are here possible as they could never be in a ten-teacher school. The natural tendency of school boards would have been to favor such a university for the 'teens. But the innocent mistake of writers who, properly convinced that multiplication of courses in a five- to ten-teacher school meant superficiality and waste, insisted that it *always* meant superficiality and waste, has established the fad of regarding a simple program of studies composed of the staple algebra, geometry, English, two or more foreign languages, and the like, as the dignified and first-class thing in a high school. Two hundred students living within a mile of one high school travel four miles to a technical high school, though of the fifty teachers in the first, five or six might well teach them what they need to learn. Five hundred of the pupils in the first school are deprived of the opportunity of studying to some little extent the technical arts and industries, though they ought to do so.

It would be far more practicable for schools with twenty-five or more teachers to do satisfactorily two years' work in advance of the present four-year secondary course than it is for over half

of the high schools to do satisfactorily the work of the last two years of the present course. The large high schools could do the work better than a third of the colleges legally giving degrees, the third having eight or less instructors.

We may expect that as American education becomes more and more rationally organized, the small college will not pretend to be more than either a pleasant and cultured social resort for youth's leisure or a fitting school for the professional schools, higher technical schools and institutions for specialized study of the sciences of nature and of man. But we may also expect that the city high schools will assume this same function of fitting schools, not for college, but for these same professional schools, higher technical schools and universities—that the large high schools will become in fact what they are now in possibility.

The twenty-five teacher high school misses some of the social advantages of the small school. Teachers do not know one another. Pupils have less chance of becoming humanized and more danger of becoming institutionalized. Democracy loses an effective helper. Athletics become a question of finance rather than play. The boys mimic college fraternities and men's clubs in their social organizations. Perhaps such measures as the provision of a special teacher to act as social secretary may relieve these disadvantages. If they cannot be avoided, it is all the more necessary for the large high school to compensate by richer provision for the more purely intellectual and practical needs of its students. If the big city high school does no more than give such a program of studies as the traditional Massachusetts high school, it probably does not do as well by its students as the smaller schools. . . .

The institutions which we call by the same name, public high schools, cannot (and probably ought not if they could) be all made to fulfill similar aims or to be administered in similar fashion. There is no typical high school in any useful sense of the

word. Probably no one of all the thousands of high schools is doing the best possible thing for education, but most of them would do worse than they now do if they all did do the best possible thing for any one of them. There are faults to be corrected by the adoption of conventional practices, but there are also faults to be corrected by abandoning conventional practices. This is so widely true because the conventions have been established by a sort of school which represents but a very moderate fraction of secondary education.

§ 16. The Inefficiency of College Entrance Examinations[1]

The facts which I shall present concern the records in entrance examinations and the academic careers of all the students of Columbia College entering in 1901, 1902, and 1903, and especially the relation between their success in the entrance examinations and their success in college. From these facts it will be proved that even so carefully managed examinations as these are an extremely imperfect means of estimating an individual's fitness for college. The suggestions to be made concern a simple and practicable development of the work of the College Entrance Examination Board which would remedy the defects of examination systems and still not introduce the doubtful features of the usual certificate systems.

In 1901, 1902, and 1903 there entered Columbia College 253 students who have complete, or nearly complete, records of standings in entrance examinations and who stayed in college through the freshman year. I have complete records of the standing through senior year of 56 of these and complete records through junior year of 130. Detailed reference will be made here only to the 130 students whose college history can be investigated for three years or more, though the facts concerning the remaining 123 have been studied in detail and give abundant corroborative evidence.

The important facts concerning the relationship of success in entrance examinations to success in college work are given in Tables 62, 63, 64 and 65. They prove that we cannot estimate the latter from the former with enough accuracy to make the

[1] This section reprints portions of an article entitled "The Future of the College Entrance Examination Board" by Edward L. Thorndike, from the *Educational Review*, May, 1906 (Vol. XXXI, No. 5).

entrance examinations worth taking or to prevent gross and intolerable injustice being done to many individuals.

For instance, 6 students out of the 130 received the same average entrance mark—61. In their college work of junior year, 1 averaged a trifle above D; 1 half-way from D to C; 1 a little above C, and 2 received A in four subjects out of five, and B in the other. In freshman and sophomore year, the range was nearly as great.

Eleven students of the 130 received in the entrance examinations marks averaging 70 in each case. In their college work of junior year, they averaged all the way from D to A.

Of the students who were in the lower half of the group in the entrance examinations, nearly 40 per cent are found in the upper half in the last three years of college.

Of the dozen students who ranked highest in entrance, some were in the lowest fifth of the class by junior year.

If, knowing that 50 individuals ranked in the order Jones, Smith, Brown, etc., in their entrance marks, one were to wager that in the college work of, say, junior year, they would rank Jones, Smith, Brown, etc., as before, he would lose his bet in 47 cases out of the 50.

The record of eleven or more entrance examinations gives a less accurate prophecy of what a student will do in the latter half of his college course than does the college record of his brother! The correlation between brothers in intellectual ability is approximately .40, but that between standing in entrance examinations and standing in college of the same person is only .47 for junior year and .25 for senior year. Even in the case of sophomore year, the correlation is only .60.

The entrance examinations also bear internal evidence of their inadequacy as measures of fitness for college. If a student who fails in his first trial of an examination gets a vastly different mark a few months or even a year later, it is clear that the

examination in so far does not test capacity so much as the carefulness of the coaching or the diligence of the candidate's cram. As a matter of fact, in 150 cases of repeated examinations, the two marks from the same student show a median difference of *over 22* (the scale of marking being the common one of 100 down to 0). The differences between the earlier and later marks of one student are greater than the difference between the marks of different students chosen at random.

Moreover, the marks on which a student is admitted are not so good a test of his fitness to do the work of the college as the marks of his first trials. If the students are ranked by their first trials of the examinations, the order corresponds much more closely to their order of achievement in college than when they are ranked by their official entrance marks.

Where there are several examinations in one general subject, such as Latin, the different marks of the same individual in the one subject vary in such eccentric ways that an individual who is marked the lowest of twenty in one is at times marked the highest of twenty in the other. The average range of difference of an individual's separate marks in Latin in the entering class of 1902 was *over 26!*

The general inadequacy of the entrance examinations from which the colleges suffer is not so important as their enormous individual inaccuracies, from which individual students suffer.

The entrance marks often utterly misrepresent the fitness of a student for college work. For instance, there were 10 men out of the 130 who in their junior year got A (the highest mark given) in at least five studies. Their average marks at entrance were in some cases in the lowest tenth of the 130, barely above the passing mark. Had the passing mark been set the least bit higher, one of the very best students of the three college classes would have been debarred from entrance. There is every reason to believe that of those students who did yet worse in the entrance

examinations and so were shut out, a fairly large percentage would have done better in college than a third of those who were admitted. Sooner or later there will be some one so barred out who would, if admitted, have been the best man in his class. It is a moral atrocity to decide the fitness of an individual for college by a system which, when required to work to a moderate degree of accuracy, is wrong 47 times out of 50!

From many facts such as these, which the scientific reader can find in tables 62–64, it is certain that the traditional entrance examinations, even when as fully safeguarded as in the case of those given by the College Entrance Examination Board, do not prevent incompetents from getting into college; do not prevent students of excellent promise from being discouraged, improperly conditioned or barred out altogether; do not measure fitness for college well enough to earn the respect of students or teachers; and do intolerable injustice to individuals. There is surely room for improvement.

It is unprofitable to seek a remedy in any modification of the examination along conventional lines. Doubtless, more elaborate examinations, the employment of more readers and the like might alleviate the chief evil somewhat, but evolution in this direction is along the line of greatest resistance. It is conceivable that some of the colleges that maintain independent examinations for entrance may secure better results, though I should expect them to be worse. I wished to study the records of 200 Harvard students in connection with the 253 Columbia records, but did not succeed in obtaining President Eliot's permission to examine the records.

The usual certificating systems are not entirely suitable to the purposes of Eastern colleges. The geographical distribution of the secondary schools which send students to, say, Amherst or Princeton makes the direct examinations of schools exceedingly burdensome; the possibility that colleges might compete for the

support of important secondary schools is distasteful; the attempt to introduce certification generally would probably result in a return to chaotic individualism.

Moreover, there is one fundamental weakness in both systems as practiced; in intent and in execution effort is directed solely toward keeping unfit students out rather than toward getting desirable students in. Both systems are connected partly as cause and partly as effect, with a shortsighted neglect of the fact that, for the good of the social organism (and, for that matter, of the college, too), it is more important to give advanced education to one boy who most needs it, can profit most by it, and use it in the world's service than to prevent from entering upon it a hundred boys who are not able to measure up to its demands. Letting incompetents into college is, perhaps, poor economy, although in a well regulated college they do not stay long, or do more harm than they get good. But to make a college education an impossibility for the really capable boy, in whose case the education is an investment by society that will yield from a hundred to ten thousand per cent, is criminal.

My suggestion for the future development of the College Entrance Examination Board aims at securing a system that is, first of all, a positive force selecting for continued education those who deserve it; a system that will, in the second place, coöperate with secondary schools in their endeavors to improve the conditions and quality of secondary school work; a system also that will, though rigorous, still be just; a system that will be rational and measure directly fitness for college, not the mere opinion of inspectors or the length and assiduity of study, or the ingenious art of parading knowledge in a form to beguile examiners; finally, a system that will be a natural development of existing arrangements and will make full use of the admirable organization furnished by the Middle States board.

It is, in brief, that the colleges which now intrust to the board

the function of examining students, intrust to it also the function of crediting schools on the basis in each case of an examination of *the actual success in college of the candidates indorsed by that school.*

Suppose, for instance, that to the board was given authority to accredit any school whose graduates already in college had, in nine cases out of ten, done satisfactory work in their studies and been desirable members of the college community. Such an accredited school would be privileged to certify a student as "fit for college" and to certify further to what extent he had done the particular kinds of preparatory work required for the various units of the board's schedule. The new work of the board would be to obtain annually, or less often, records from the different colleges of their students classified as *Satisfactory* or *Unsatisfactory*. These records the board would sort out in accordance with its lists of secondary schools and their indorsed graduates. Some hours' computation of percentages would complete the work. The work of college admission committees would be to treat the certificates from accredited schools precisely as they now treat the certificates of the College Entrance Examination Board. The work of the accredited school would be to secure and fill out the general certificates of fitness for college and the special certificate of having taken courses qualified to fulfill such and such particular admission specifications. Students not certificated by their schools and students from schools not accredited by the board would be examined as now.

We would have, that is, neither of the conventional admission systems, but a rigorous, continuous, and absolutely impartial examination of each school on the basis of its actual work in furnishing candidates who demonstrated their fitness for college by their work in college.

Such a system would encourage boys and girls who were in the truest sense fit for college to go there, for the fundamental

certificate would be the outcome, not of a complex computation of what particular species of disciplines the pupil had undergone but of the judgment of the teachers who knew him best that he was really fit for college. The award of this general certificate would encourage many students of first-rate capacity and promise who lacked some of the particular preparation demanded by a college to proceed to secure it. A college education would become less the consequence of early parental decision and more the consequence of demonstrated capacity. The award of the general certificate would also encourage the colleges to admit on probation a student of excellent promise who, by some accident of fortune, had not taken the college preparatory course in high school; for they could then do so without elaborate special legislation and without incurring the reproach of lowering standards. The standard of capacity would, in such cases, be as high as ever and as high as anywhere.

Such a system would improve the work of the secondary schools by setting a higher standard of attainment and at the same time abandoning prescriptive interference. The main duty of the high schools is to train boys and girls to be capable and intelligent men and women. They and the public which supports them are willing to accept also the responsibility of fitting for college the small minority of their students who will go on to an academic degree; but they ought not to be asked to fit students primarily for an arbitrary set of examinations. With such a task, they cannot be expected to resist the temptation to give up a large part of the last two years to specific coaching for the process of examination taking. The proportion of college students who go on to professional courses is far greater than the proportion of high school students who go on to a college course, yet the colleges would think it an insane arrangement if they had to fit students for elaborate and arbitrary examinations in physiology, chemistry, bacteriology, and the like, or in the psychol-

ogy of religion, ecclesiastical history, church law, and Hebrew. The examination disease can be eliminated, and with an actual raising of standards, if a school's fitness to prepare for college is measured by the actual fitness of the students it prepares.

Such a method of accrediting is obviously just to schools. Now that a perfectly trustworthy body exists to receive reports from all colleges, no school can complain if it is denied credit until the records of its graduates improve. It is also just to individuals, so far as any system which the colleges would be willing to operate can be. Occasionally an able candidate who happens to have gone to an inefficient school or to have been misjudged by his teachers, will have to run the risk of proving his ability by the unfair test of arbitrary examinations, but at present *every* able candidate has to run this risk. Occasionally, an able candidate will be held back a year longer than he ought by over cautious teachers, but a few years will demonstrate to those high school teachers who do not already know it that success in college is dependent on capacity ten times as much as upon mere amount of high school training, and they will soon abandon the false notion that they can maintain the credit of their school by holding back pupils. They will never abandon it under the present examination system; for under such a condition it is true; quantity of drill *is* a means of securing high standings in arbitrary examinations. The present system is a paradise for stupid boys —with clever tutors. A sagacious tutor can get a hundred boys into college, not one of whom he would be willing to certify to as fit to succeed there.

Such a system is rational because it measures the ability of schools to fit for college, not their ability to forearm students against the twin cataclysms of preliminary and final examinations. It puts the premium on capacity and right habits of intellectual work, rather than on the mass of information held in solution at a given week. It avoids the dangers, possible under

the ordinary certificating systems, of misjudgment of schools by inadequate or eccentric inspection. It measures directly and exactly the fact we wish to measure. . . .

Finally, such a system would be established through a natural modification of the function of an already existing organ through an easy extension of the powers of the present board. No new machinery and only the simplest legislation is required. The only important change would be to add to the present duties and powers of the board the duty of rating schools by the success in college of the students they had vouched for and the power to accept from schools of a given rating a certificate that John Doe "is fit for college," and a certificate that John Doe "has done work equivalent to that recommended by the Middle States board for English 1, English 2, History 1," etc., etc. The colleges which approve the system would vote simply to accept the board's examinations of schools as they now accept its examinations of individual students. The work of the board and of college admission committees would be lightened.

Of the many administrative advantages of the plan, and of the possibility of unity of action amongst colleges throughout the country on the basis of a scheme so safe and yet so plastic, I do not care to speak, at least at this time. The system proposed is rational, just and practical. It positively encourages the right students to go to college instead of making laborious, but futile efforts to keep a few incompetents out. On these facts alone I rest my case.

Tables 62, 63, 64, and 65 show for each individual the relation between entrance standing and college standing. Horizontal position denotes the rank in entrance (the median of the highest eleven marks obtained). Vertical position denotes the rank in college studies (the average of the five highest marks obtained)—in Senior year in Table 62, in Junior year in Table 63, etc. Each

figure entered in the table means so many students. Thus in Table 62 the 1 at the upper left-hand corner means that one student scoring 60 in entrance scored 4 in the college work of Senior year. The other 1 in the same column means that one student scoring 60 in entrance scored 21 in college work. The 1 in the next vertical column means that one student scoring 61 in entrance scored 24 in college work. The vertical column under 70 would read: Of 10 students, each ranking 70 in entrance examinations, one ranked 15 in the college work of Senior year, one 16, four 18, one 19, one 21, one 22, and one 27.

The values 60, 61, 62, etc., up to 95 of the horizontal scale, are directly obtained from the entrance marks, which are given on the ordinary scale of from 100 down. The values 4, 5, 6, up to 30 of the vertical scale, are obtained from the college records of A B C D and F by taking A = 6, B = 4, C = 3, D = 1 and F = 0.[1] Thus 30 = five As, 28 = four As and one B, 27 = four As and one C, 26 = three As and two Bs, 25 = three As, one B and one C, or four As and one D, etc., etc.

[1] A = 10, B = 7, C = 5, D = 2, and F = 0 would perhaps have been juster.

TABLE 62

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—SENIOR YEAR

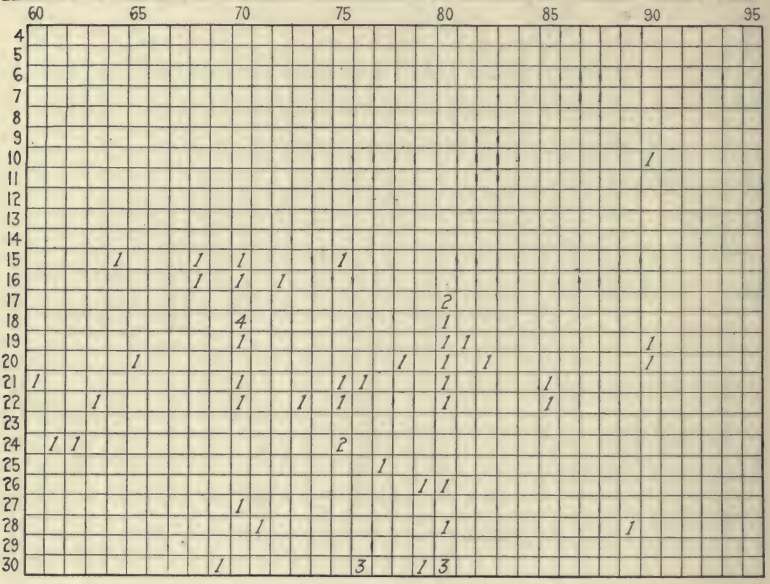


TABLE 63

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—JUNIOR YEAR

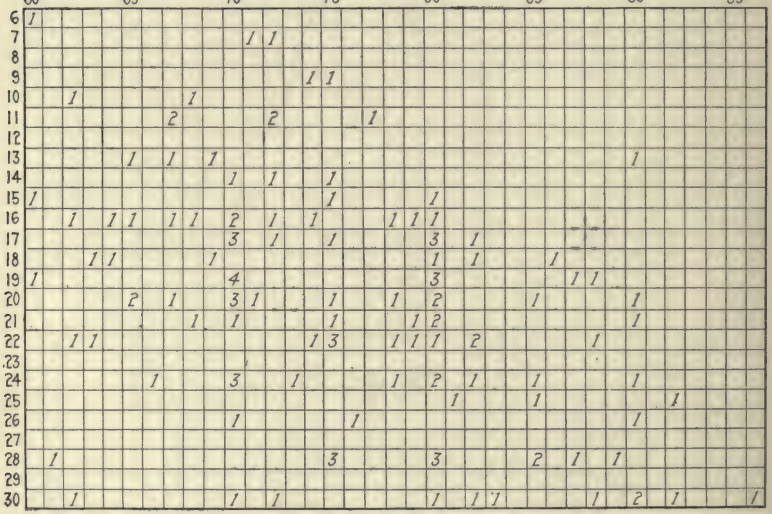


TABLE 64

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—SOPHOMORE YEAR

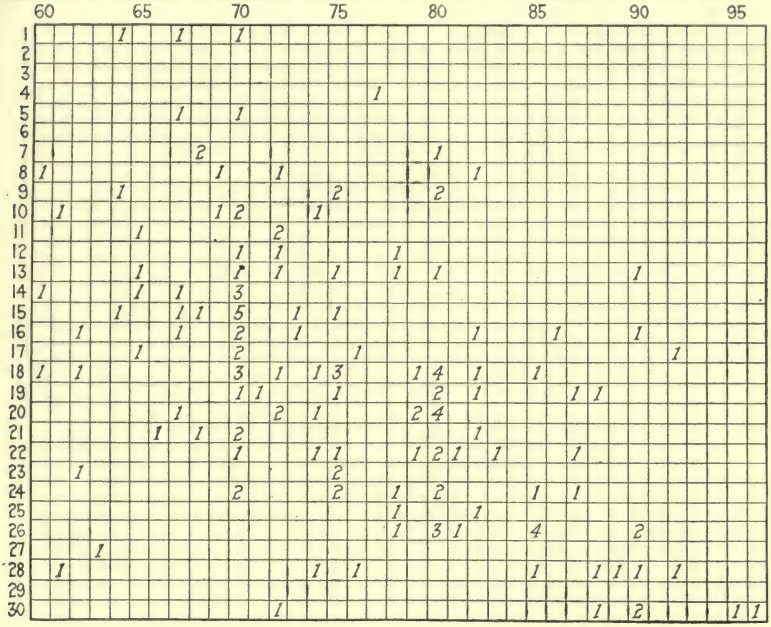
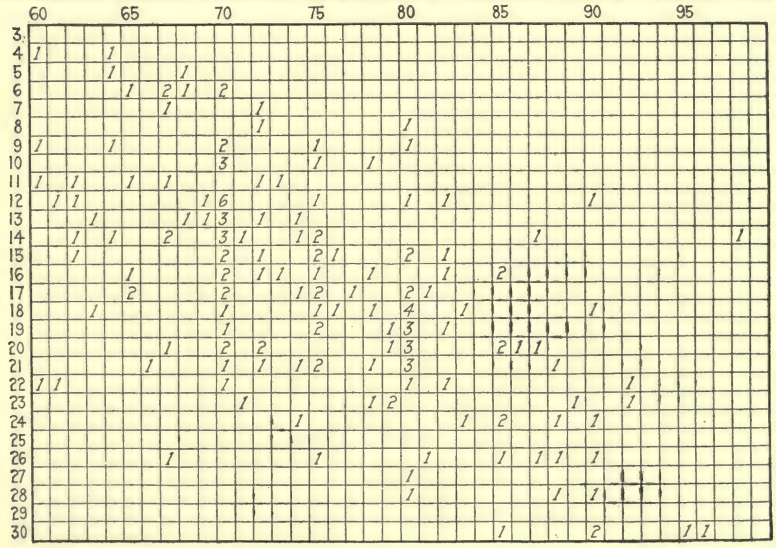


TABLE 65

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—FRESHMAN YEAR



§ 17. The Studies Actually Taken for the A. B. Degree

In view of the frequent discussions and proposals with respect to the course of study for the bachelor's degree in American colleges, it seems desirable to present the facts concerning the actual courses taken by representative students. Admiration of a set of printed requirements is misguided if in fact they are not followed; and criticism of follies which a given scheme is supposed to encourage is wasted if in fact it does not produce them.

I therefore give in the tables that follow (Tables 66-75) the actual composition of the work done for the A. B. degree by 391 men students graduating in 1909 [1]—21 at Columbia, 36 at Bowdoin, 42 at Cornell, 50 at Harvard, 49 at Princeton, 20 at Stanford, 38 at Wesleyan, 40 at Williams, and 95 at Yale; also for 22 women at Wellesley. These individuals were all chosen at random, being the first in alphabetical order.

The tables give for each student separately the thousandths of his total course [2] devoted to:

1. Latin, Greek and Semitic
2. German, French, Spanish and Italian
3. English
4. Philosophy, Psychology, Logic and Ethics

[1] For the original data from Columbia, Cornell, Princeton and Stanford, I am indebted to Mr. F. P. Keppel, Dean of Columbia College. For those from Yale, I am indebted to Dr. C. H. Judd, Director of the School of Education of the University of Chicago. The other data I owe to the courtesy of the administrative officers of the several institutions.

[2] Approximately. The number of points made in each subject was decided, not by their sum in every case, but by the total degree requirement or the average of their sums for all the students reported from the college in question. This is in the end fairer, but as a result the sum of the numbers in a row may not total to exactly one thousand.

5. History, Economics, Government and Sociology
6. Physics and Chemistry
7. Biological Sciences
8. Other Natural Sciences
9. Mathematics
10. Music and Art.

In these tables each horizontal line represents the work for the bachelor's degree of one individual. The career he expects to follow is stated where it is known. Each entry represents the number of thousandths of the "hours" or "points" required in all for the degree which the individual at the left of the entry gave to the subject at the top of the column in which the entry is.

Thus the first line of the Bowdoin table (Table 66, on page 190) reads: Individual No. 1, intending to be a lawyer, earned 72 thousandths of his points in ancient languages, 54 in modern foreign language, 263 in English, and so on.

I am convinced that a careful study of these individual curricula is the best, and perhaps an indispensable, introduction to any scientific study of the college course. It will be well to examine them one by one with specific questions in mind, such as: Which are apparently bad combinations? How do the combinations at Harvard, under a system of free election, but within the non-professional studies, differ from those in the other colleges save Stanford? How do the Stanford combinations, under a system where the student chooses a major subject, and the head of that department in large measure chooses the courses for the student, differ from those at Harvard on the one hand and at the other colleges on the other hand? How far do students avail themselves of professional options, when such are offered, as at Columbia and Stanford and, to some degree, at Cornell? How much specialization was there under the regulations in force in these colleges in 1905–9? How much "scattering" was there?

TABLE 66

BOWDOIN

		Anc. Lan.	Mod. Lan.	English	Phil. Psy.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	
		1	2	3	4	5	6	7	8	9	
1	law	72	54	263	54	354	81	81	27		
2	"	27	318	290	54	163		81	27	72	
3	"	72	245	263	54	190	54			72	ed. 27
4	"	72	81	263	54	218	54	27	36	127	ed. 27
5	"		163	290	54	163	54		36	127	ed. 54
6	teaching	100	381	236		81		27	27		
7	"		381	290		109	109			72	
8	"		300	154		54	218	54	27	54	dr. 54
9	"		163	290	54	218	54	136		72	ed. 27
10	medicine	127	163	290		54	54			72	med. 250
11	"		272	127	27	109	81	81		72	med. 250
12	"		163	181		136	109	81		72	med. 250
13	"		163	181	54		381		27	181	dr. 54
14	"	27	435	263	54	54	54			72	ed. 54
15	?	127	109	318	163	136	54	81	27		
16	"	72	327	209	27	163	109	27		72	
17	"	72	272	263	54	54	218			72	
18	"	127	327	236	54	190	54			18	
19	"		272	209	54	81	163	81		72	
20	"	172	272	290	54	127	54		27		
21	"	72	272	290	54	272					
22	"	36	272	209	54	300		27		36	ed. 54
23	"		163	318	54	218	54	27	27	72	ed. 27
24	chemist	72	272	181	27		272			127	dr. 54
25	"	72		318	54	136	300	27	27		ed. 54
26	engineering	109	163	181	27	54	272		63	154	dr. 81
27	electrician	72	272	236	27	136	136	54	54		ed. 27
28	forestry	127	218	290	27	27	81	54	27	72	ed. 54
29	manufacturing	72	381	181	54	190	54			72	ed. 54
30	"		272	209	54	245	136			72	
31	"	72	381	209	54	109	109			72	
32	express	36	218	209	27	381	81	27	27	36	
33	banker	318	327	127			109		45	127	
34	business	27	190	290	54	245	54	27		72	ed. 54
35	undertaker	145	272	181	54	54	190	54			
36	journalist	27	272	290	54	272				72	

Also 9 for each student in hygiene.
dr. = Drawing; ed. = Education; med. = Medicine.

TABLE 67

COLUMBIA

	Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Art Mus.	Education	
	1	2	3	4	5	6	7	8	9	10	11	
1	80	100	175	300	175	133	50		50	33		
2	100	250	117	267	100		100					
3	50	225	87	50	50	33	50		50			500 engineering
4	217	125	150	50	217	133	33		25	33		
5	133	367	83	75	50	83	33		50		42	250 law
6	50	50	83	50	50	67	67		83	33	42	500 architecture
7	100		225	100	100	67	67		50	33		250 law
8	383	67	83	100	75	67	67		50		50	
9	83	100	233	150	283	67	100					
10	117	150	117	50	150	117		50	50			250 law
11	50	200	183	75	200	64		50	17			250 law
12	433	100	117	150		67			33		17	
13	50	100	83	100	50	50	100		33			500 medicine
14	150	217	300	158	133	67			50			
15	50	233	233	100	100	67		50	33	50		100 law
16	208	158	100	75	100	100			50	17		250 law
17	100	233	150	50	150	67	67		33			250 law
18	50	25	83	100	100	33	67		267		350	
19	50	175	167	183	83	33	33	33	50			250 law
20	50	167	83	50	50	117			83			500 engineering
21	50	208	142	83	142	50	67	33			60	250 law
22		100	83	100	50	67	167		50			500 medicine

Also 33 for each student in gymnasium.

TABLE 68

CORNELL

		Anc. Lan.	Mod. Lan.	English	Phil., etc.	Education	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Drawing	
		1	2	3	4		5	6	7	8	9	10	
1	law	110	141	265	94		203	47			47	83	
2	"	31		180	102		344			47	47		234 law
3	"	110	305		141		375	47					
4	"		70	94	164		367	94			78		31 law
5	"	94	94	180	141		453				47	31	
6	"		180	172	47		461			78			
7	"	63	188	23	273		63	31		63	47		234 law
8	"		125	188	63		273				78		258 law
9	"		47	211	70		578		31				
10	law or teaching	203	234	47	47	117	305						
11	teaching		183	47	94	94	47	86		47	391	47	
12	"		188					477			359	31	
13	"	70	438	70	133	180	16				78		
14	"	55	281	78	16	125	508						
15	"	133	78	485	133	31	102			47			31 a
16	"	359	242	149	94		211	47					
17	"	203	125	47	31		516			47	47	31	
18	"		94	117			70	203	375	94	125		
19	(d)		313	94	39	110			70				164 a 125
20	teaching or ?	219	164	31	23	133	39				321		
21	?	273	172	94	47	141	172	78			47		
22	?		94	211	110		391	47		39	78		
23	?	156	227	250	47		23	47	47	16	63		16 a
24	?		47				8	695		47	94		23 b
25	?	211	547	188		31							
26	?	110	188	141	47		391	31		78	31	23	
27	medicine		188	47	86			196	219			16	297 medicine
28	"	16	125	117	23		78	234	149	23	47		297 "
29	"	16	149	47			47	258	133	47	39	31	297 "
30	"	63	110	141	125		117	149	125				
31	"	47	117	94	47			180	227		78		297 "
32	chemist						8	758		63	78		23 b
33	"		47					727		70	78		23 b
34	"		47					775		94	55		23 b
35	"		70				47	766		63	86		23 b
36	"		141					758		94	125		23 b
37	dyer		149	70	23		125	383		23		78	23 c
38	manufacturing		78	141	23		125	265		78			23 b 188 engineering
39	"		70	258	23		531	16		110			
40	"	10	47	336	47		336	47	63	141			
41	painter		94	329	117		94	78	55	16			31 a 47 b
42	business	63	336	47	23	55	117	188				47	

a = Architecture. b = Drawing. c = Unknown; records as M. A. (d) = Supervisor of Drawing.

TABLE 69

HARVARD

	Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Art, Mus.	
	1	2	3	4	5	6	7	8	9	10	
1		235	118	29		471	29		59		
2		176	88		59	412		88	118		
3	118	59	353	382	59						
4		676	147		235						
5	118	118	59	59	118	118			294	59	
6		176	265	147	471	59				59	
7		118	176	147	206	118		29		294	118 a. 29 en.
8	294	118	118	29	353	59		29	88	59	
9		235	147		617		29				59 ed.
10		176	176		235	118		176		59	88 m. 88 en.
11		88	382	88	176	147				59	
12		59	88		59	235					676 en.
13		176	147		176				59	176	29 m. 118 a. 59 m.
14	118	59	147	88	529						
15	29	118	206	118	294	59	59	29		118	
16	118	176	176	118	441						
17		59	59	29	186	59	59		118		
18	176	176	118	59	412					118	
19		59	29		176	59		88	118		412 en.
20			118		147	59	59	559			29 m.
21	118	176	353	206	88						
22		118	382	235	235	59					
23		59	265	176	412	59				59	
24		176	29	118	598	59					
25		235	118	235	265						235 ed.
26		59	118	176	235	59			29	176	29 en.
27	59	265	176	294	294	59					
28	147	118	176	118	294						88 en.
29	235	176	59		59	176	59		176		
30		598	147		471						
31		382	176	88	265					59	
32	29	147	176	59	176	59	118	29		118	29 m. 118 en.
33	176	471	265		59						
34		176	147	176	559	59					
35	59	118	324	147	294	99			29	88	
36	235	471	353	88			59				
37	59	59	147	118	441	59	59		99	59	
38	59	324	147		471						
39		235	382	59	324					118	
40	118	147	265	88	324		59				59 ar.
41		147	147	29	353	59				235	59 a.
42	59	412	59	59	324				59		
43		118	59	176	618	59			205		
44	294	59	118		118	147		29			147 en.
45		265	206	88	382					59	
46		235	118		471	59				118	
47		235	676	235	118						
48		59		147	676			29	59		
49		118	59	59	647		59	58			
50		176	176	88	353		59		29	176	29 m. 29 en.

NOTES.—a. = Architecture and landscape architecture; ar. = Archæology; ed. = Education; en. = Engineering; m. = Mining.

TABLE 70
PRINCETON

	Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Art, Mus.	
	1	2	3	4	5	6	7	8	9	10	
1	177	177	129	48	315	48		24	64		
2	298	32	153	73	315	48			64		
3	323	32	299	48	145	48			64		
4	177	177	153	48	315	48			64		
5	177	177	81	48	339	48			64		
6	202	129	81	48	315	73		24	113		
7	177	129	250	48	218	48			64	48	
8	177	129	153	48	363	48			64		
9	226	81	56	121	387	48			64		
10	202	105	153	48	303	48		24	64	24	
11	177	129	129	48	339	48		24	64		24 a
12	177	81	153	97	315	48			113		
13	177	129	56	48		315		24	113		169 b
14	177	177	153	48	315	48			64		
15	177	129	177	291	97	48			64		
16	177	81	177	48	315	48		24	64		48 a
17	202	129	105	97	363	48			64		
18	177	129	323	48	145	48			113		
19	177	81	153	73	339	48		24	64		24 c
20	177	81	153	97	339	48		24	64		
21	226	430	56	48	48	48		24	64		48 d
22	202	105	81	48	339	48		24	113		
23	274	105	347	97	48	48			64		
24	177	129	299	48	145	48	24	48	64		
25	177	145	129	48	315	97		73	64	24	24 c
26	177	105	105	48	315	48			64		
27	177	81	177	48	121	121	194		64		
28	177	32	105	48	315	97		97	64		48 c
29	177	32	105	48	315	97		97	64		48 d
30	250	105	299	48	97	48	24	48	64		
31	226	32	129	73	315	97	24	24	64		
32	468	274		48	48	48			64		
33	185	105	299	48	73	73			64	48	
34	250	32	177	48	339	48		24	64		
35	177	323	177	48	121	48		24	64		
36	370	32		339	48	48			113		
37	177	32	177	48	315	48		24	113	24	24 c
38	250	177	347	97		48			64		
39	177	129	153	48	363	48			64		
40	177	105	153	48	316	97		24	64		
41	177	81	81	48	339	73		48	64	24	48 d
42	177	129	105	97	315	73			64		24 c
43	177	129	323	73	169	48			64	64	24
44	177	129	177	48	315	48		24	64		
45	177	81	153	97	339	48			64		24 a
46	202	129	105	97	339	48			64		
47	274	32	153	48	339	48		24	64		
48	177	105	347	48	145	48			64	48	48 d
49	177	105	56	48	315	145	48	24	64		

a = Biblical literature. b = Graphics, graphic statics and geodesy. c = Geodesy. d = Architecture.

TABLE 71

STANFORD

	Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Law	Engineering	
	1	2	3	4	5	6	7	8	9			
1	25	132		33	140	140	372			91		
2	148	47	101	85	194				31	326	(1)	
3	50	50	83		670		41			83		
4						121		48	242	32	532	24 d
5						145			234		597	
6	17	83	140	42	331		74		17	273	17	
7						149			240		612	
8	33		132	58	331		83			322		
9						161		339	274		274	
10		50	174	33	355		50	25		273		
11	198		298	25	331		74		33			17 ed.
12	32	127	167	32	262		48		48	262		
13						109		16	225	16	597	16 d
14	31	240	78	23	326					318		
15		157				471	83	107	149	17		
16						33		58	240		653	
17	17	232	140	25	240			25		273		25 d
18		147	31			411		16	225		163	
19		140	78	62	380		16	25		287		
20	8		24	24	97	137	202	25	185	32	15	242 ed.

d.=Drawing. ed.=Education.

[1] Also 23 art, 16 drawing and 16 ed. Also for all students save 5, 7, 14 and 18, from 8 to 50 in gymnasium.

TABLE 72

WELLESLEY

	Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Art.	Hygiene	Biblical History	
	1	2	3	4	5	6	7	8	9				
1		130	111	56	111	222	185	56	74	56	19	93	
2		463	260	56	56			56	74		19	74	
3		130	333	111	241		56		74		19	93	
4		74	111	56	222	407		56	74		19	74	
5		352	260	56	111	130			74		19	74	
6		74	407	83	194		56	56	74		19	93	
7		185	296	56	111	74			74	93	19	74	56 ed.
8			379	56	157			56	74		19	74	
9		537	167	56			56	56	74		19	111	
10		74	148	56	167		241	56	185		19	93	
11	260	130	204	56	74			111	74		19	93	56 ed.
12		352	167	56		130		56	185		19	93	
13		185	352	56	111	56	74		74		19	74	56 ed.
14	74	260	167	56		56		56	185	56	19	93	56 ed.
15		352	130	56	56	56	167		74		19	93	56 ed.
16		74	148	56			74		74	537	19	74	
17		296	333	56			74	56	74		19	93	56 ed.
18		74	426	56	167			167	74		19	74	
19		287	250	56	111	185			74		19	74	
20	74	352	241	56	56	56	56		74	93	19	93	
21		130	352	56	74		56		74	93	19	93	56 ed.
22	204		389	56	74			56	74	111	19	74	

TABLE 73

WESLEYAN

		Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.
		1	2	3	4	5	6	7	8	9
1	teaching	133	150	117	59	17	142	133	150	67
2	"	67	117	133	92	267	100	50	17	183
3	"	133	150	100	125	33	325	133	83	133
4	"	67	50	842	150	33	67	100	83	67
5	"	133	217	233	142	33	83	67		67
6	"	150	300	133	109	100	67	17		67
7	"	133	183	183	100	50	100	267		67
8	"	167	150	175	159	67	150	33		117
9	"	133	450	175	42	83	87	33		67
10	"	333	200	233	100		87	50	33	
11	"	217	200	175	83	67	83	33	33	67
12	"	200	200	175	109	67	83	50		67
13	"	133	406	242	159	33	83	17		67
14	"	67	133	425	92	33	17	133	50	67
15	law	67	167	200	75	350		50	17	67
16	"	100	183	233	75	292	67	50		117
17	"	133	150	225	75	200	117	50	17	67
18	"	67	100	200	192	317	33	83	50	67
19	"	133	217	125	75	267	183			150
20	"	67	283	159	59	167	67	67	17	73
21	ministry	133	133	325	225	67	67	17	33	67
22	"	133	100	333	142	67	67	50	83	67
23	medicine	183	250	142	92	33	83	200		44
24	chemist	158	258	83	42	83	442	50		142
25	"	67		109	142	33	392	100	50	67
26	science	133	150	100	117	67	83	217		67
27	business	67	83	209	175	183	117	117	17	67
28	"	133	200	159	92	33	292	17		117
29	"	67	100	133	225	133	83	75	33	67
30	"	133	233	250	92	133	117	133		67
31	"	67	317	125	142		142	133	50	67
32	"	133	150	117	109	67	300	33		167
33	"	67	317	225	75	150	83	67	50	67
34	philanthropy	250	167	167	75	67	192		33	117
35	insurance	133	217	110	59	167	183	67	33	67
36	civil service	133	317	109	125	92	117	50	33	67
37	publishing	67	67	375	42	267	59	83		44
38	journalism	133	50	325	75	350	25			67

TABLE 74

WILLIAMS

		Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.
		1	2	3	4	5	6	7	8	9
1	law	267	100	217	125	150	67	33		67
2	"	75	217	275	25	242	67	33		67
3	"	192	167	208	100	142	108	33		67
4	"	167	100	233		217	92	33	50	67
5	"	183	200	100	125	192	67	33	100	67
6	undecided	167	100	258	100	107	67	33	50	67
7	"	467	100	192	100	25	67	33		67
8	"	50	275	217	75	142	108	33	75	67
9	"	183	217	258		133	100	50		67
10	"	142	250	83	50	175	167	33	100	67
11	"	208	117	167	75	192	67	33	100	67
12	"	208	100	108	50	242	108	33	100	67
13	teaching	408	117	167		217	67	33		67
14	"	283	50	117	25	75	283	50	50	67
15	"	233	217	117	75	217	67	33	50	67
16	adv. study	167	50	58	50	417	67	33		
17	" "	217		225	75	92	67	33	25	67
18	medicine	183	233	117	25	100	200	125	50	67
19	"	50	308	200	75	142	200			67
20	engineering	50	167	200	25	75	283	50	25	167
21	"	183	117	117		192	67	50	50	233
22	chemist	183	50	58		75	208	50	100	233
23	M. I. T. (1)	183	167	117	50	50	200		75	183
24	varnish	183	117	333	75	192	150			67
25	manufacturing	50	167	183	25	192	250			142
26	shoes	50	267	167	150		100	33		58
27	publishing	167	150	200	50	283	125		50	67
28	library supplies	167	167	175	125	133	67	33		67
29	broker	117	117	133	75	142	192	33	50	67
30	travel	50	283	125	75	167		33	125	67

1 M. I. T. equals "study at Mass. Inst. of Tech."

TABLE 75

YALE

		Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Art, Mus.	Bible
		1	2	3	4	5	6	7	8	9	10	11
1	law	217	133	167	50	333				50		
2	"	100	167	167		317		33	100	50		a
3	"	317	217		100	167		17	83	33	33	
4	"	50	50	150	67	517	50		83	50		
5	"		167	200	50	417	150			50		
6	"	50	50	200	83	467	50		83	50		
7	"		267	267	50	367	50	17		50		
8	"	50	250	150	83	283			83	50		
9	"	100	200	133	133	283	100		33	50	33	
10	"	50	183	183	117	283	50		33	67	17	50
11	unknown	50	133	183	83	333	150		67			
12	"	50	100	200	67	250	183		67	133		
13	"	50	300	200	133	150	50	17		100		
14	"		317	117	100	83	100	67	117	100	17	
15	"		100	217	100	300	100		67	100		
16	"	367	267	83	117	100		17	83			
17	"	233	200	17	50	367	100			133		
18	"	17	50	233	183	367	100		83	50		
19	"	100		183	217	233			100	17		133
20	"	350	183	167	83	150			117			
21	"	200	100	133	67	317		17	100			50
22	"		283	250	33	317		17	83	17		
23	"	367	233	167	50	83	50			50		b
24	"		100	150	83	467	100		83	50		
25	"	150	133	267	100	183	50	17	33	50	33	
26	"	133	150	100	83	317	50	17	83	50	17	
27	"	50	183	200	50	183	183		33	100		
28	"	200	100	167	133	283		17	83		17	
29	"	100	250	100	167	217			83		33	50
30	"	150	100	217	167	250	100		33			
31	"	50	333	150		300	100	17		50		
32	"		333	150	100	247	100		50	50	33	
33	"		250	183	167	150	50	17	67	50		
34	"	100	100	167	50	150	183		67	233		
35	"	150	133	150	100	350		17	83			50
36	"	233	67	83	100	333	100	17		100		
37	"	233	50	200	33	433			83			50
38	"		50	150	67	467	100	17	117	50		50
39	"	117	167	283	50	350		17	100	17		
40	teaching	233	200	167	100	167	50	17	33	50		
41	"	200	283	183	117	217	50			50		
42	"	17	183	267	117	83	250	67		33	17	
43	literature and education	100	267	250	100	167	50		83			
44	publishing	50	183	233	83	267	100	17	67			
45	medicine		233	233	167	183	100	17	33	67	17	
46	"	100	133	217		250	150	67	33	50		
47	"		150	300	83	267	50	17	33	50	17	50
48	medical missionary	100	150	167		167	200	117	50	50		

a = Archæology 67. b = Archæology 33.

TABLE 75

YALE (*continued*)

		Anc. Lan.	Mod. Lan.	English	Phil., etc.	Hist., etc.	Ph. Chem.	Biol. Sci.	Other Sci.	Math.	Art, Mus.	Bible
		1	2	3	4	5	6	7	8	9	10	11
49	ministry	183	50	117	133	350			117			217
50	"	100	150	117	150	150	50		50			283
51	"	150	100	300	117	100	50			50		150
52	"	283	183	133	83	183	50		33	100		
53	missionary	50	100	183	100	317	100	17	33	50		50
54	"	117	150	200	100	250	100	17	33	50		
55	journalism	267	317	133	100	83	50		33	100		
56	"	233	200	183	50	217			83		33	
57	"	100	50	167	17	550			100	50	17	
58	banker		300	217	33	267	50	17	83	50		
59	"	83	133	283	50	250		17	133	50		
60	"	50	183	233	67	367		17	83	50		
61	"	100	150	217	33	400			100			
62	bonds	100	150	167	83	250	50	17	83	100		
63	broker		133	200	117	350	50	17	100	17	17	
64	"	150	150	167	50	333		17	133	50		
65	"	133	200	100	117	317		17	100		17	83
66	"	83	133	67	83	383	50		33	33	33	
67	steel (or bonds)	150	50	283	50	233	50	17	100	50	17	
68	broker	150	50	250	83	300			133		17	
69	life ins.	50		250	133	433	83	17	50	50		
70	geol.		50	117	33	200	183	50	267	117		
71	arch.	100	350	117		150	100			133	67	
72	"	83	167	217		333		17	100	50	33	b
73	florist	100		150	117	300	150	117	83			
74	consul	50	117	83	117	467			100	33		b
75	lumber	50	33	200	67	500	50	17	83			
76	"	50	250	250	100	217	100	17				
77	oil	50	100	183	100	400		17	117	33		
78	manufacturing		183	250	50	350	50	17	83	50		
79	"	50	150	283	50	383	50		100	50		b
80	"	50	250	100	50	250	100		33	167		
81	"	133	150	183		400		17	17	100		
82	"	250	100	117	117	350		17	83			b
83	"		100	250	100	233	100	17	50	50		
84	"	100	350	50	50	167	150		33	100		
85	"	267	67	267	50	317	33	17	83			
86	"	100	100	167	100	267	100	17	67	67		
87	business	200	50	117	183	350			100			
88	"	100	50	217	100	383		17	83	50		
89	"	100	133	217	167	233	50		83	33		
90	"	100	233	100	33	367	50	33	40	50		
91	"		150	250	117	317		17	100	50	17	
92	"	50	183	233	83	317	50	17		50		
93	railroad	200	67	217	67	317	50		83			
94	"		317	50		167	300	17		167		
95	steamship	100	133	250	33	283	50	17	100			b

b = Archæology 33.

In the case of which group of studies—(a) the languages and literatures, (b) the science of human affairs and (c) the natural sciences—does the amount of study bear the lowest ratio to the significance of the study for modern civilization? What evidence is there that the accidental dominance of some personal view has made certain departments specially strong or has framed regulations requiring certain studies far more than is usually the case and so has led to a notably larger attention to one or another study in the one institution than is given to it by students in general?

I note here two samples of the facts which the reader can get in response to such questions:

Thus, Table 76 gives certain objective measures of the frequency of notable *specialization* in the case of these students.

TABLE 76

SPECIALIZATION

PERCENTAGES WHICH THOSE SPENDING OVER HALF OF THEIR COURSE FOR THE A. B. DEGREE IN STUDYING CERTAIN GROUPS OF SUBJECTS ARE OF THE TOTAL NUMBER ATTAINING THE A. B. DEGREE

	Lang. and Lit.	Social. Hist. Econ. Gov.	All Natural Sciences	Engineering	Medicine	Architecture
Bowdoin	61		6			
Columbia	24			10	10	5
Cornell	14	10	17		see note a.	
Harvard	32	16	6	2		
Princeton	31					
Stanford		5	20	25	see note a.	
Wellesley	55		5		see note b.	
Wesleyan	53					
Williams	38					
Yale	26	3	1			

(a) If the combination of the "hist. econ. gov." group with law is counted as one group, and if the combination of science and medicine is counted as one group, we have added 40% at Stanford, and 70% at Cornell, of the former sort of specialization; and 12% at Cornell of the latter sort.

(b) One case, 5%, for music and art.

The above data of Table 76 give evidence (1) that specialization toward a profession will occur when it is permitted, as at Stanford, Columbia and Cornell; (2) that free election (but within non-professional courses) increases specialization outside of languages and literatures (Harvard); (3) that, in the other colleges, specialization by candidates for the A. B. degree is chiefly in languages and literatures, a specialization artificially cultivated by the requirements in these subjects for entrance and graduation. The student is far less able to find out in the secondary school his interests and abilities in the sciences of nature and human affairs and, save at Harvard, is less free to devote much time to them in colleges.

As a sample measurement of the extent of apparent "*scattering*" we may take for each college the percentage of graduates who did not devote at least one fifth of the total degree requirement to any one of the following: (1) Ancient language, (2) Modern foreign languages, (3) English, (4) Philosophy, etc. (5) History, (6) Economics, (7) Government and public law, (8) Physics and chemistry, (9) Biological science, (10) Other natural sciences, (11) Mathematics, (12) Art and music, (13) Education, (14) Law, (15) Medicine, (16) Engineering, (17) Architecture.

The percentages are given in Table 77.

TABLE 77

THE FREQUENCY OF "SCATTERING"

Bowdoin	0
Columbia	0
Cornell	0
Harvard	12
Princeton	46
Stanford	0
Wellesley	0
Wesleyan	8
Williams	5
Yale	7

Of these cases of apparent diffusion over half are individuals each giving three tenths of the degree requirement to history, economics, government and public law; many of the others represent conceivably closely related work (*e. g.* of the six Harvard cases, Nos. 10, 26, 28 and 50).

PART IV

STUDIES OF SCHOOL ACHIEVEMENTS

§ 18. Means of Measuring Educational Products

Any educational effect or achievement is a change in some individual or group. Such a change is demonstrated by the attainment of some condition or status known not to have existed prior to the action of the educational force in question. It is measured by the comparison of the condition without and that with the action of the force. We prove the existence of and measure changes in human beings as elsewhere by comparing two static conditions.

These conditions are known to us only by their objective manifestations, their productions of observable facts, sums done, books read, lies not told, illness not suffered, and so on through the endless list of facts produced or prevented.

Observation of an individual's life leads us to define and measure his condition or status in any particular in one of two ways, either (1) as an amount of some thing or quality or power, or (2) as a position in comparison with the conditions of other men.

Thus a boy, in penmanship, may be measured (1) as writing a "barely legible" hand, or (2) as being next to the worst boy of a hundred of his age. Thus a girl, in knowledge of the German language, may be measured as (1) able "to read easy German at sight" and as knowing a certain 1600 words, a certain 120 constructions and a certain system of forms, or (2) as having the best acquaintance with German of any first year student.

That a pupil can "add and subtract with integers," or can "read words of one syllable," or can cook edible bread—these are all measurements by the absolute amount of something, however vaguely and crudely the amount is defined. That a pupil is a "good student," or that he was graded "excellent" in history, or that a man of science is in the upper five hundred of the Cat-

tell list, or that a poet is "eminent"—these are all measurements by relative position.

Educational measurements of the former sort can be improved by defining exactly and objectively what is meant by any given measure so that we can all mean the same thing by it, and by getting aids to convenient and precise identification of any condition or status as equivalent to some exactly defined measure.

Educational measurements of the latter sort can be improved by defining the relative positions—*e. g.* as 29th from the top of 1000—and by defining the group in relation to which the fact is placed—*e. g.* as twelve-year-old children in New York City in 1910, or as compositions written in the first year of high school in an hour's time without preparation or assistance, or as "the thousand most eminent men of science in America."

Educational measurements of the latter sort, though of great value when properly treated, are essentially inferior to those of the former sort. Other things being equal, reference to some objective scale or series of standard amounts of the thing in question, is much preferable to reference to a given place in a total series of miscellaneous samples of the thing. And one chief task of the science of education is to work out units and scales for educational forces and products as the physical sciences have done for mass, temperature, work, electrical potential, electrical energy, and the like.

As a sample of the methods and results of such studies of the means of measuring educational achievement, I quote from a monograph on Handwriting by one of the present authors.

The Construction of a Scale for Quality of Handwriting in the case of Children in Grades 5 to 8

If one selects from children's written work 1000 samples ranging from the best to the worst handwriting found in grades 5 to 8

and tries to rank these 1000 samples in order of merit for handwriting, one finds that he cannot make 1000 such ranks. Some of the handwritings will be indistinguishable in "goodness" or "quality" or "merit." Nor can one make 100 such ranks. Nor can one make 40. One can make about 20, but if he so ranks the samples a number of times he gets substantially the same average result as he gets when he ranks them a number of times in 10 or 11 groups. To get an individual's judgment of the relative merits of the 1000 samples it is sufficient to have him rank them in 10 or 11 groups three or four times. If he grades in 10 groups and tries to make the differences in "goodness" or "quality" or "merit" all equal—to make, that is, the sample he puts in the highest group (call it 11) as much superior to those in the next highest group (call it 10) as the latter are to those he puts in the second from the highest group (call it 9), etc., etc.—we have in the average [1] result of his groupings his judgment of the relative merits of the samples in a specially convenient form. For instance, if he grades sample 217 as in group 5 three times, as in group 4 once, and as in group 6 once, and grades sample 218 as in group 6 three times, in group 5 once and in group 7 once, he judges 218 to be "1" better than 217, "1" being, in the individual's judgment, one tenth of the difference between group 1 and group 11.

If thirty or forty individuals chosen from competent judges of handwriting thus judge the 1000 samples, the average [1] of all their gradings of a sample, gives approximately its relative merit in the judgment of competent judges in general. If they grade sample 317 in group 3 two times, in group 4 five times, in group 5 thirteen times, in group 6 thirteen times, in group 7 five times, and in group 8 two times, their average or median grade for it is 5.5. If their average or median grade for sample 318 is 6.4, they esteem 318 as .9 better than 317. The .9 means, in their judg-

[1] Except for certain factors which will be described on page 226.

ment, nine tenths of one tenth of the difference between grade 1 and grade 11.

If now from all the 1000 samples we could find some which were graded exactly 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11, by the average or median [1] judgment of 30 or 40 competent judges, each grading the set into groups 1 to 11 by what he thinks are equal steps in merit, we would have a very useful scale of merit in handwriting. It would include all grades from the worst to the best and would proceed by what were, by the average competent opinion, equal steps. Or, if we could find some graded 1.5, 2.4, 3.3, 4.2, 5.1, 6.0, 6.9, 7.8, 8.7, 9.6, and 10.5, we would have a scale nearly as useful. It would not be so likely to include the very worst and very best samples, but would proceed by equal steps, as before.

The scale which I shall proceed to describe was obtained by a method in principle the same as the above.

Such a scale could be got in a different way, as follows: Suppose competent judges to compare each sample with every other, stating in each case which was better. If then we picked out samples a, b, c, d, etc., such that a was judged better than b just as often as b was judged better than c, and just as often as c was judged better than d, and so on, we would have, in samples a, b, c, d, etc., a scale by equal steps, if two other conditions were fulfilled by them. The first of these conditions would be that a should not be judged better than b and worse than b *equally* often. For it if were, a would be equal to b, b to c, c to d, and so on, and we would have no extent to our scale. The second of these conditions would be that a should not *always* be judged better than b. For, if it were, it might be just enough better to barely be so judged, or it might be very, very much better.

Only if differences are not always noticed can we say that

[1] Except for certain factors which will be described on page 226.

differences equally often noticed are equal. But if we had, as a result of the judgments, facts like those below, we could say that a, b, c, d, etc., represented samples of writing progressing by equal steps of difference in quality.

1000 comparisons of a, b, c, d, etc., being made:

a was judged better than b in 73 per cent, equal to b in 11 per cent, and worse than b in 16 per cent of the judgments.

b was judged better than c in 73 per cent, equal to c in 11 per cent, and worse than c in 16 per cent of the judgments.

c was judged better than d in 73 per cent, equal to b in 11 per cent, and worse than b in 16 per cent of the judgments, and so on for d-e, e-f, ... n.

The scale which I shall describe was tested throughout by this second method. The two methods do not give results that correspond exactly. The variations follow this rule: Judges will notice differences between poor samples when they compare them directly one with another which they would not count in rating them by a mental scale. For example, suppose samples a, b, c and d to be rated 10, 9, 3, and 2 by comparison with a mental scale of eleven grades by equal steps. The percentage of judges regarding 10 as better than 9 will be smaller than that regarding 3 as better than 2.

Since we get two different scales by the two methods, there are four alternatives. We may adopt one or the other or combine them, or give the results by both methods. I shall take the latter alternative, but shall at this point present only the scale as derived by the first method.[1]

The scale given here is then a scale in which the steps of difference are equal in the sense of being called equal by competent judges. Equal will mean just this in the following discussion.

[1] For the scale as derived by the second method see Section 12 of The Teachers' College Record, March, 1910.

The Nature of the Scale

Pages 213 to 222 contain or rather *are* the upper part of the scale for merit of the handwriting of children of grades 5 to 8. . . . Each set of samples represents a point on this scale. The samples on page 213 are of quality 18 and 17; the samples on page 214 are of quality 16; the samples on pages 215 and 216 are of quality 15; and so on, as far as quality 11. I show also quality 5 (on page 223) and the quality chosen as approximately zero (on page 224).

The use of 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 for these qualities of handwriting means, first of all, that 14 is as much better than 13, as 13 is than 12; that 13 is as much better than 12, as 12 is than 11, and so on. In the second place it means that quality 14 is two times as far above 0 merit in handwriting as quality 7 is; that quality 16 is twice as far above 0 merit in handwriting as quality 8 is, and so on. Zero merit is defined roughly as writing as bad as sample 140 (see page 224), as a handwriting, recognizable as such, but of absolutely no merit as handwriting. The use of several samples under one quality means that those samples are of equal merit. The full scale[1] includes samples of as many different styles as could be obtained, so that in using the scale the merit of any sample of any style of writing can be quickly ascertained by comparison with the scale. The full scale also extends in actual samples by children from nearly the worst writing[2] of fourth-grade children (quality 5) to nearly the best writing of eighth-grade children (quality 17). The scale thus extends from a quality, better than which no pupil is expected to produce, down to a quality so bad as to be intolerable, and probably almost never found, in school practice in the grammar grades.

[1] For the complete scale, see The Teachers College Record, March, 1910, in p. 11 ff.

[2] In a formal exercise in writing at their "natural" rate.

A Scale for Handwriting of Children in Grades 5–8

The Unit of the Scale Equals approximately One-Tenth of the Difference between the Best and Worst of the Formal Writings of 1,000 Children in Grades 5–8. The Differences 16–15, 15–14, 14–13, etc. Represent Equal Fractions of the Combined Mental Scale of Merit of from 23 to 55 Competent Judges.

Quality 18. Sample 125

showed that the rise and fall of the tides
the attraction of the moon and sun upon

Quality 17. Sample 141

Then the carelessly dressed gentleman,
stepped lightly into Warren's carriage and,
held out a small card, John vanished be-

Quality 16. Samples 32 and 84

Then the carelessly dressed gentle-
man stepped lightly into Warren's
carriage and held out a small

gentlemen stepped lightly into
Warren's carriage and held out
a small card, John vanished

Quality 15. Samples 49 and 89

lightly into Warren's carriage and held out a small card, John vanished behind the bushes and the carriage moved along down the drive

held out a small card, John vanished behind
the bushes and the carriage moved along
down the driveway. The audience of passers-

Quality 15. Samples 47 and 96

Then the carelessly dressed gentle-
man stepped lightly into Warrens
carriage and held out a small white

John vanished behind the bushes
and the carriage moved along
down the driveway. The audience

Then the carelessly dressed gentleman stepped lightly into Warren's carriage and held out a small card, J

Then the carelessly dressed gentleman stepped lightly into Warrens carriage and held out a small card, John vanished behind

Quality 13. Samples 55 and 24

Then the carelessly dressed gentleman stepped lightly into Warren's carriage and held out a

ushed behind the bushes and the carriage moved along down the driveway. The audience of passers-by which had

Quality 13. Samples 4 and 26

Then the carelessly dressed gentlemen stepped lightly into Warren's carriage and

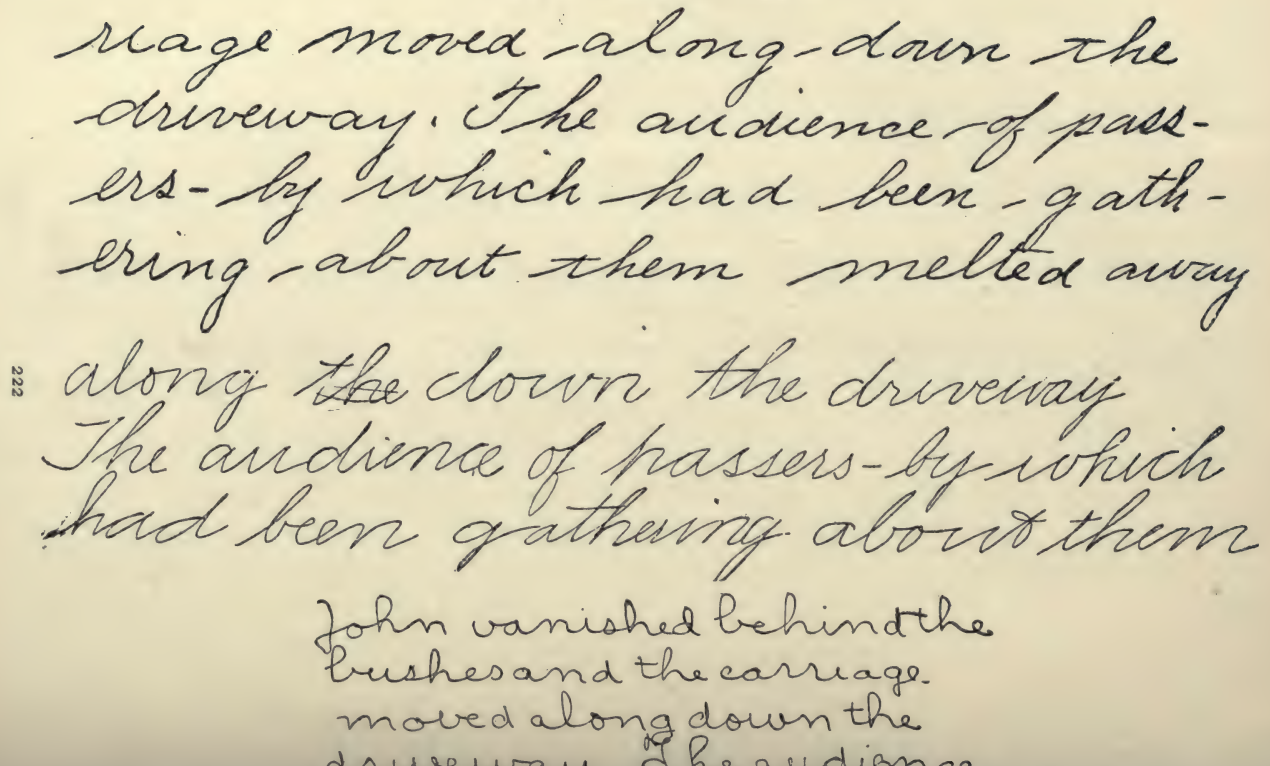
Then the carelessly dressed gentleman stepped lightly into Warren's carrige and

behind the bushes and the carriage moved
along down the driveway. The audience
of passers-by

then the carelessly dressed gentlemen stepped
lightly into Warren's carriage and held out a small
card, John vanished behind the bushes and the

Quality 12. Sample 30

lightly into Warren's carriage and held out a small card, John vanished behind the bushes and the carriage moved along down the drive-


riage moved along down the
driveway. The audience of pass-
ers-by which had been gath-
ering about them melted away
222
along the down the driveway
The audience of passers-by which
had been gathering about them
John vanished behind the
bushes and the carriage
moved along down the
driveway The audience

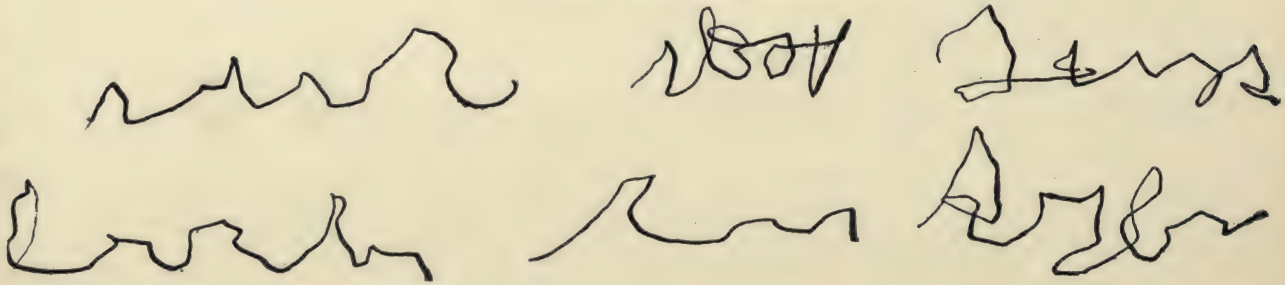
Quality 5. Sample 6

bushes and the carriage

swayed along down the

driveway. See under

Sample 140, representing zero merit in handwriting. Zero merit is arbitrarily defined as that of a handwriting, recognizable as such, but yet not legible at all and possessed of no beauty.



If one had a finer scale, its use would give but slightly more accurate results, and would require more practice and more time.

Any specimen of handwriting is measured by this scale by putting it alongside the scale, as it were, and seeing to what point on the scale it is nearest. If one wishes to measure more finely than to units, he can add or subtract a fraction according as the sample to be measured seems better or worse than the quality of the scale to which it is nearest.

The sample to be measured should, for convenience, be examined with the entire scale in view. If the scale's samples are arranged in order on a table or against a wall, the examined sample is easily compared with them. The measurer then decides what quality of the scale the sample possesses and records the measure. The measurer should be, of course, careful not to decide its grade because of its likeness in *style*, but only because of its likeness in *quality* to some sample of the scale. If, for instance, one has a pronounced vertical that is really of quality 18, one must not call it quality 17, because it is in style more like sample 141 than like the sample of quality 18. The measure may be made more and more accurate by having other judges also measure, each always in ignorance of the ratings given by the others. In default of other judges, the measure may be made more accurate by rating the sample two or three times, each time in ignorance of the ratings previously given. An individual may be measured more accurately by using several samples of his writing, each being rated in ignorance of the ratings given to the other samples.

The Derivation of the Scales

I shall give here only such notes as are likely to be helpful to any one who is stimulated by this scale to construct similar scales for other educational products. The principles stated here for

a scale for merit in handwriting are valid for other educational products as well.

To construct a scale by which to measure various qualities (that is, amounts of merit) in handwriting ranging from, say, x to $x+y$, it is desirable to have samples of quality, not only of every degree from x to $x+y$, but also of qualities worse than x and of qualities better than $x+y$. The reason is that otherwise the exact values of samples at x or x plus a slight amount and samples at $x+y$ or $x+y$ minus a slight amount cannot be directly measured, but only inferred.

For example, call x 1 and y 10. $X+y$ then being 11, x or 1 is nearly the worst and $x+y$ or 11 is nearly the best of a series of samples, ranging continuously from x to $x+y$.

If now any one is required to fix in mind 11 points including x (or 1) and $x+y$ (or 11) differing each from the next by equal amounts, and to rate each of the samples as 1, 2, 3,—9, 10, or 11, according to which of these mentally fixed points it seems most like, he can err by rating a sample as 2 or 3 when it is really 1, but cannot err by rating it 0 or minus 1 when it is really 1. Similarly he can err by rating it 9 or 10 when it is really 11, but cannot err by rating it 12 or 13.

Unless the set of samples to be rated includes some samples, one, two, three, and even four grades better than the best quality ($x+y$) to be represented in the final scale and also some samples one, two, three grades worse than the worst quality (x) to be represented in the final scale, one cannot get the values of $x+y$ and x themselves save by inference.

Hence, to make a scale for the handwritings of, say, 10-year-old school children conveniently, it is necessary to have a collection of samples varying in quality from much below the worst to much above the best of their writings. This involves the use of "unnatural" samples, which may seem very objectionable, but which as a matter of fact does little or no harm.

In the case of a scale for the merit of English compositions by high school pupils one should start from a collection of compositions ranging by small gradations from compositions much worse than the worst point on the final scale is to be, to compositions much better than the best point on the final scale is to be. Here the extremely bad ones may be obtained by artificial construction, from the feeble-minded, or from very old and stupid grammar school children. The extremely good ones may be obtained from the printed or manuscript compositions in youth by gifted authors.

To get samples exactly situated at points differing progressively by equal steps requires that the original set range from one extreme to the other by very slight gradations. This means for practical purposes that one must have at the start a very large number of samples. After these have been graded by enough judges to rate each roughly, only those which are near the points to be represented by the scale need be graded further. As the value of each sample of this narrower selection is determined more exactly by further judgments, only those very near the points to be represented on the final scale need be preserved for still further judgments; and so on till the values of enough samples are determined to the degree of precision required for the scale itself.

Points on the scale exactly determined, but not at progressively equal steps, can be got with far less labor. If, for example, after a single rating I had picked samples at intervals from the best to the worst and then had only these few samples rated by the twenty to seventy judges, the value of each could have been stated nearly as exactly as is the case on the samples of the scale. But there would form a series like 17.33, 16.65, 16.28, 15.82, 15.40, 15.47, 15.23, 14.95, 14.7, etc., instead of the approximate 17, 16, 15, 15, 15, 15, 15, 14, 13, 13, 13, etc., of the scale. They would have served the purpose of a scale as well so far as aiding an ob-

server to make exact measurements which any other observer could verify, and to report them unambiguously, but the labor of allowing for the decimal values or of computing measures expressed in awkwardly long numbers would burden each person using the scale. If the scale were designed for use only by scientific investigators of education, I should have economized in respect to the number of samples rated, had far more ratings of each sample, and presented a scale of very exactly determined qualities but at irregular intervals. For the common use of pupils, teachers, and supervisory officers a less precise scale by approximately equal steps seemed far more valuable.

It is possible that the determination of the amount of difference between their median values by the percentage of judges noticing the difference is preferable to the determination by the amount of difference between the median values, as given by judges attempting to apply to each a scale of mentally equal differences. I used both methods.

In general, the experience in constructing this scale gives great encouragement to the hope that for many educational facts, units and scales may be invented that shall enable us to think quantitatively in somewhat the same way that we can about facts of physics, chemistry, or economics. It has been commonly supposed that the great complexity of such facts as examination papers in spelling, manifestations of interest in history, acts of moral significance, habits of industry, essays, poems, inventions, replies to questions demanding logical inferences, and other like results of education, prevents the samples composing any one such group from being measured by any one linear scale at all comparable to a foot rule or thermometer or galvanometer.

It is true that some judges find it hard to judge handwriting for the complex of legibility, beauty, ease, "character," etc., into which "quality" or "goodness" or "merit" resolves itself. But none of them found it impossible to do so, and most of them rated

the writing for the complex—"merit or goodness in your opinion," as readily as an appraiser would rank articles of sale by money price, or as a little child would arrange pieces of paper in the order of their size regardless of the fact that some were squares, some circles and some triangles.

The entire history of the judgments of the merit of handwriting supports the claim that if a number of facts are known to vary in the amount of anything which can be thought of, they can be measured in respect to it. Otherwise, I may add, we would not know that they varied in it. Wherever we now properly use any comparative, we can by ingenuity learn to use defined points on a scale.

Further acquaintance with the procedure by which a scale for the measurement of any objective educational product may be derived from a sufficient number of ratings by expert judges may be had by reading Dr. M. B. Hillegas' account of "A Scale for the Measurement of Quality in English Composition by Young People" (Teachers' College Record, Sept., 1912). By the voice of forty experts Sample 580 is regarded as of zero or "just not any" merit as English writing by a young person in his 'teens.

Quality 0.

580. Letter

Dear Sir: I write to say that it aint a square deal Schools is I say they is I went to a school. red and gree green and brown aint it hito bit I say he don't know his business not today nor yeaterday and you know it and I want Jennie to get me out.

Sample 595 is judged to be better than sample 580 by 89.1 per cent of competent judges (202 in number) and so, by virtue of a theory of the distribution of judgments well known to psychologists, is recorded as differing from sample 580 by 1.83 times the

P. E. (the amount of difference which 75 per cent of the judges would discriminate correctly).

Quality 1.83

595. My Favorite Book

the book I refer to read is Ichabod Crane, it is an grate book and I like to rede it. Ichabod Crame was a man and a man wrote a book and it is called Ichabod Crane i like it because the man called it ichabod crane when I read it for it is such a great book.

Sample 618 is judged to be better than sample 595 by 69.8 per cent of the judges and so, by virtue of the theory just referred to, is recorded as differing from 595 by .77 times the P. E.; and consequently as differing from zero (sample 580) by 1.83 P. E.+.77 P. E., or 2.60 P. E.

Quality 2.60

618. The Advantage of Tyranny

Advantage evils are things of tyranny and there are many advantage evils. One thing is that when they opress the people they suffer awful I think it is a terrible thing when they say that you can be hanged down or trodden down without mercy and the tyranny does what they want there was tyrans in the revolutionary war and so they throwed off the yok.

Sample 94 is judged to be better than sample 618 by 76.7 per cent of the judges, and so is recorded as differing from sample 816 by 1.09 P. E.; and consequently as differing from the zero of the scale by 1.83 P. E.+.77 P. E.+1.09 P. E., or 3.69 P. E.

Quality 3.69

94. Sulla as a Tyrant

When Sulla came back from his conquest Marius had put himself consul so Sulla with the army he had with him in his conquest

seized the government from Marius and put himself in consul and had a list of his enemys printy and the men whoes names were on this list we beheaded.

So we have as a scale so far:

Sample 580 as 0
" 595 " 1.83
" 618 " 2.60
" 94 " 3.69

In a similar way Sample 519 is assigned a value of 4.74; sample 534, a value of 5.85; sample 196, a value of 6.75; sample 221 a value of 7.72; and so on for the balance of the scale not presented here.

519. De Quincy

First: De Quincys mother was a beautifuul women and through her De Quincy inhereted much of his genius.

His running away from school enfluenced him much as he roamed through the woods, valleys and his mind became very meditative.

The greatest enfluence of De Quincy's life was the opium habit. If it was not for this habit it is doubtful whether we would now be reading his writings.

His companions during his college course and even before that time were great enfluences. The surroundings of De Quincy were enfluences. Not only De Quincy's habit of opium but other habits which were peculiar to his life.

His marriage to the woman which he did not especially care for.

The many well educated and noteworthy friends of De Quincy.

534. Fluellen

The passages given show the following characteristic of Fluellen: his inclination to brag, his professed knowledge of History, his complaining character, his great patriotism, pride of his

leader, admired honesty, revengeful, love of fun and punishment of those who deserve it.

196. Ichabod Crane

Ichabod Crane was a schoolmaster in a place called Sleepy Hollow. He was tall and slim with broad shoulders, long arms that dangled far below his coat sleeves. His feet looked as if they might easily have been used for shovels. His nose was long and his entire frame was most loosely hung to-gether.

221. Going Down with Victory

As we road down Lombard Street, we saw flags waving from nearly every window. I surely felt proud that day to be the driver of the gaily decorated coach. Again and again we were cheered as we drove slowly to the postmasters, to await the coming of his majestie's mail. There wasn't one of the gaily bedecked coaches that could have compared with ours, in my estimation. So with waving flags and fluttering hearts we waited for the coming of the mail and the expected tidings of victory.

When at last it did arrive the postmaster began to quickly sort out bundles, we waited anxiously. Immediately upon receiving our bundles, I lashed the horses and they responded with a jump. Out into the country we drove at reckless speed—everywhere spreading like wildfire the news, "Victory!" The exileration that we all felt was shared with the horses. Up and down grade and over bridges, we drove at breakneck speed and spreading the news at every hamlet with that one cry "Victory!" When at last we were back home again, it was with the hope that we should have another ride some day with "Victory."

§ 19. School Achievement in Arithmetic

Dr. C. W. Stone ['08] in his study of " Arithmetical Abilities and Some of the Factors Determining Them " made a study of arithmetical achievements of children in the sixth grade in twenty-six school systems. This investigation evaluated the results secured not only in the fundamental operations but also in reasoning. All of the tests were given by Dr. Stone himself under conditions as nearly identical as was possible. Great care was taken in securing the results as will appear from the following discussion and table.

"The scores for the reasoning problems were determined from the result of two preliminary tests—one, giving one hundred sixth grade pupils all the time they needed to do the problems as well as they could in the order as printed; and another, giving one hundred sixth grade pupils all the time they needed to do problems as well as they could in the *reverse* order from that as printed. The results as tabulated below in Table 78 show that scores for reasoning problems of Grade-six pupils can be very definitely arranged in a scale on the basis of relative difficulty. Just what the scale should be can only be determined by determining the form of distribution and the location of the zero point. From what is known of these the scale of weighting shown in the last column of Table 78 is believed to be the best, and this is the one employed in the computations of this study. . . ."

". . . . In both reasoning and fundamentals the scores used as a measure of the achievement of a system were computed by combining the scores of one hundred pupils. Where more than one hundred pupils were tested, the papers used were drawn at random, the number drawn from each class being determined by the ratio of its number to the total number tested in the system.

Where less than one hundred pupils were tested, the combined scores made were raised to the basis of one hundred pupils."

TABLE 78

PRELIMINARY TESTS IN ARITHMETIC

REASONING—UNLIMITED TIME

100 DIFFERENT PUPILS TESTED EACH TIME

Number of Problems	% Reasoned Correctly as Printed	% Reasoned Correctly as Reversed	Average % Reasoned Correctly	Weight According to Average % Correct	Weight Used as Probably the Best
1	95	92.6	93.8	1	1
2	86	82.2	84.1	1.1	1
3	94	89	91.5	1	1
4	80	83	81.5	1.15	1
5	88	86	87	1.1	1
6	69	57.4	63.2	1.5	1.4
7	70	80	75	1.25	1.2
8	29	44	36.5	2.6	1.6
9	19	15.5	17.2	5.45	2
10	24	27.4	25.7	3.6	2
11	17	7.5	12.3	7.6	2
12	7	16.4	11.7	8	2

Precautions Observed to Make the Scoring Accurate

" The simplicity of the tests made the scoring comparatively easy, and with the observance of the following precautions it is believed that a high degree of accuracy was attained. (1) In so far as practicable, all the papers were scored by a single judge—only two persons being employed on any phase of the work for the entire twenty-six systems; (2) each problem was scored through one hundred or more papers, then the next followed through, etc.; (3) the score for each part of each problem, the errors, etc., were entered on a blank provided with a separate column for each item; (4) where there was doubt as to how the score should be made, the scorer made a written memorandum

of how the case was finally decided and this memorandum served as the guide for all future similar cases."

What the Scores Measure

"As used in this study the words *achievements*, *products*, *abilities*, except where otherwise qualified, must necessarily refer to the results of the particular tests employed in this investigation. That some systems may achieve other and possibly quite as worth-while results from their arithmetic work is not denied; but what is denied is that any system can safely fail to attain good results in the work covered by these particular tests. Whatever else the arithmetic work may produce, it seems safe to say that by the end of the sixth school year, it should result in at least good ability in the four fundamental operations and the simple, everyday kind of reasoning called for in these problems. It does not then seem unreasonable, in view of the precautions previously enumerated, to claim that the scores made by the respective systems afford a reliable measure of the products of their respective procedures in arithmetic."

The following tables from Dr. Stone's study show the scores received by each of the twenty-six systems tested in reasoning and in fundamentals together with deviations from the median score, comparative achievements and comparative time expenditure and the ratio of time expenditures to abilities.

ACHIEVEMENTS OF THE SYSTEMS AS SYSTEMS

Measured by Scores Made

TABLE 79

Scores of the Twenty-Six Systems in Reasoning with Deviations from the Median. Scores from all Problems M=551

Systems in Order of Achievement	Scores Made	Deviations from the Median	Deviations in Per Cent of the Median
XXIII	356	—195	—35
XXIV	429	—122	—22
XVII	444	—107	—19
IV	464	—87	—16
XXV	464	—87	—16
XXII	468	—83	—15
XVI	469	—82	—15
XX	491	—60	—11
XVIII	509	—42	—8
XV	532	—19	—3
III	533	—18	—3
VIII	538	—13	—2
VI	550	—1	—2
I	552	1	2
X	601	50	9
II	615	64	12
XXI	627	76	14
XIII	636	85	15
XIV	661	110	19
IX	691	140	20
VII	734	183	33
XII	736	185	34
XI	759	208	38
XXVI	791	240	44
XIX	848	297	54
V	914	363	66

TABLE 80

Scores of the Twenty-six Systems in Fundamentals with Deviations from the Median. Scores from all Problems M=3,111

Systems in Order of Achievement	Scores Made	Deviations from the Median	Deviations in Per Cent of the Median
XXIII	1,841	—1,270	—41
XXV	2,167	—944	—30
XX	2,168	—943	—30
XXII	2,311	—800	—26
VIII	2,747	—364	—12
X	2,749	—362	—12
XV	2,779	—332	—11
III	2,845	—266	—8
I	2,935	—176	—6
XXI	2,951	—160	—5
II	2,958	—153	—5
XVII	3,042	—69	—2
XIII	3,049	—62	—2
VI	3,173	62	2
XI	3,261	150	5
IX	3,404	293	9
XII	3,410	299	10
XXIV	3,513	402	13
XIV	3,561	450	14
IV	3,563	452	14
V	3,569	458	15
XXVI	3,682	571	18
XVI	3,707	596	19
XVIII	3,758	647	21
VII	3,782	671	22
XIX	4,099	988	31

TABLE 81

THE RELATION OF ACHIEVEMENT IN ARITHMETIC TO TIME ALLOTMENT

SYSTEMS	COMPARATIVE ACHIEVEMENTS			COMPARATIVE TIME EXPENDITURE				TIME DISTRIBUTION AMONG GRADES					
	Average serial standing	Serial standing in reasoning	Serial standing in fundamental	Serial standing in time expenditure	Week minutes devoted to arithmetic	Week minutes devoted to all subjects	Per cent of time to arithmetic	Lower numbers show week minutes devoted to arithmetic; upper show per cent of school time devoted to arithmetic in each grade					
								1	2	3	4	5	6
XXII...	1	1	1	14	1,150	9,675	12	7	6	12	15	15	15
								100	100	200	250	250	250
XXV....	3	4	2	2	722	8,700	8		7	9	10	9	13
									100	140	155	130	197
XXII...	4½	5	4	1	507	7,200	7		8	8	8	7	11
									90	90	90	90	147
XX.....	5	7	3	15	1,161	8,200	14	7	10	12	14	15	15
								80	113	210	240	265	253
XVII....	7½	3	12	21	1,283	7,500	17	2	12	20	20	24	23
								27	158	250	258	300	290
VIII....	8	11	5	18	1,258	9,600	13	2	14	15	15	15	15
								25	233	250	250	250	250
XV.....	8	9	7	16	1,173	8,025	15		11	15	20	17	18
									147	213	292	250	271
III.....	9	10	8	6	944	8,025	12	10	9	11	11	12	16
								125	125	150	150	165	229
XXIV...	10	2	18	7	950	8,775	11			14	17	17	17
										200	250	250	250
X.....	10	14	6	5	921	8,550	11		7	12	12	14	18
									88	154	184	216	279
I.....	11	13	9	9	1,068	9,375	11		9	13	14	14	15
									130	213	238	238	249
IV.....	12	4	20	26	1,854	8,400	22	28	20	20	24	20	23
								249	300	306	361	300	338
II.....	13	15	11	17	1,247	9,900	13	8	12	14	14	15	16
								121	192	217	225	233	259
XXI....	13	16	10	4	865	7,650	11	8	10	10	12	14	13
								80	100	100	180	210	195
VI.....	13	12	14	11	1,126	9,000	13		8	12	18	18	19
									127	177	266	266	290
XVI....	14½	6	23	12	1,127	9,000	13	5	8	13	18	17	16
								75	113	187	263	251	238
XIII....	15	17	13	25	1,626	8,475	19		26	23	18	19	19
									388	350	288	300	300
XVIII..	16	8	24	19	1,265	8,700	15	6	5	15	20	20	19
								75	75	225	300	300	290
IX.....	17½	19	16	22	1,559	9,000	17	13	15	18	18	18	21
								200	225	275	275	275	309
XI.....	18½	22	15	10	1,130	8,575	13		11	15	18	18	18
									157	216	250	250	257
XIV....	18½	18	10	23	1,560	8,850	18	15	16	18	19	19	19
								225	245	270	280	270	270
XII.....	19	21	17	13	1,148	8,400	14		6	18	16	19	19
									81	226	255	288	298
XXVI...	22½	23	22	3	837	7,200	12	7	10	10	13	13	17
								80	125	125	150	150	207
VII.....	22½	20	25	24	1,573	7,800	20	13	19	22	22	22	17
								175	262	300	300	300	236
V.....	23	25	21	8	971	8,700	11	8	10	11	12	13	13
								113	154	167	175	183	179
XIX....	25	24	26	20	1,276	9,000	14	8	10	17	17	13	20
								125	150	250	250	250	301

TABLE 82

COMPARISON OF THE ACHIEVEMENTS OF THE SYSTEMS HAVING LESS THAN MEDIAN TIME COST WITH THOSE HAVING MORE

	COMBINED SCORES OF THE THIRTEEN SYSTEMS			
	With *less* than Median Time Cost	With *more* than Median Time Cost	With *less* than Median Time Cost	With *more* than Median Time Cost
	Including home study		Without home study	
Reasoning	7,519	7,893	7,277	8,135
Fundamentals	40,751	40,273	37,165	43,859

TABLE 83

RATIO OF TIME EXPENDITURES TO ABILITIES

SYSTEMS	AVERAGE RATIOS		REASONING RATIOS		FUNDAMENTAL RATIOS	
	Serial Standing of Systems	Time Cost to Reasoning and to Fundamentals	Serial Standing of Systems	Time Cost to Reasoning	Serial Standing of Systems	Time Cost to Fundamentals
IV	1	2.26	1	3.99	4	.520
XXIII	2	1.92	2	3.22	1	.624
XVII	3	1.65	3	2.88	7	.421
XIII	4	1.54	4	2.55	3	.533
XX	5	1.45	7	2.36	2	.535
XVIII	6	1.41	5	2.48	13	.336
XIV	7	1.40	7	2.36	6	.438
VIII	8	1.39	8	2.33	5	.457
IX	9	1.353	9	2.25	5	.457
XVI	10	1.352	6	2.40	18	.304
XV	11	1.31	11	2.20	8	.422
VII	12	1.28	12	2.14	9	.415
XXIV	13	1.24	10	2.21	21	.270
II	14	1.22	14	2.02	7	.421
VI	15	1.20	13	2.04	11	.354
I	16	1.15	15	1.93	10	.363
III	17	1.05	16	1.77	16	.331
XII	18	0.943	17	1.55	13	.336
XXV	19	0.941	17	1.55	15	.333
X	20	0.93	18	1.53	14	.335
XI	21	0.913	20	1.48	12	.346
XIX	22	0.91	19	1.50	17	.311
XXI	23	0.82	21	1.37	19	.293
V	24	.67	23	1.06	20	.272
XXII	25	0.65	22	1.08	23	.219
XXVI	26	0.64	24	1.05	22	.227

From this investigation Dr. Stone concludes, "That a large amount of time expended is no guarantee of a high standard of abilities may be convincingly seen by comparing the ratios of the five systems spending the smallest amount of time with the five spending the largest. Of the five spending the least time, the average ratio is .80, which corresponds with the 23d or the 3d from the best in ratio; and of the five spending the greatest amount of time, the average ratio is 1.57, which corresponds with the 4th poorest in ratio.

"The last three tables have each shown the decided lack of relationship between time cost and abilities produced, and hence for these systems it is evident that there is practically no relation between time expenditure and arithmetical abilities; and, in view of the representative nature of these twenty-six systems, it is probable that this lack of relationship is the rule the country over.

"This is not to say that a certain amount of time is not essential to the production of arithmetical abilities; nor that, given the same other factors, operating equally well, the product will not increase somewhat with an increased time expenditure. What is claimed is that, as present practice goes, a large amount of time spent on arithmetic is no guarantee of a high degree of efficiency. If one were to choose at random among the schools with more than the median time given to arithmetic, the chances are about equal that he would get a school with an inferior product and conversely, if one were to choose among the schools with less than the median time cost, the chances are about equal that he would get a school with a superior product in arithmetic.

"So far, then, as ability in arithmetic means ability to handle such foundation work as is measured by the tests in this study, this 'essential' has not *necessarily* suffered by the introduction of other subjects and the consequent reduction of its time allotment."

Dr. Stone finds that the influence of the home is not responsible for differences in abilities. He says: "Environment probably has little effect on arithmetical abilities. Of the five highest systems, the majority of pupils of one came from a crowded tenement district, those of two from exceptionally good homes, and those of two from fair. Practically the same distribution is found among the five systems standing lowest." When the time devoted to home study is considered the correlation between abilities and time expenditure is somewhat closer. In the main, differences in abilities are to be explained by teaching and supervision. These differences will grow less when teachers and supervisors know just what results they want to secure and when it is common to make such accurate measurements frequently.

§ 20. School Achievement in Terms of Methods of Work

Education aims to equip children with knowledge, with habits, with appreciations, with ideals and with methods of work. Too often the demand made upon the teacher both by supervisory officers and by the general public, leads him to emphasize results in knowledge or habit to the exclusion of any very definite attempt to secure power of appreciation, purposes of lasting significance, or any adequate command of the methods to be employed in the education which takes place without the aid of a teacher. Teachers, especially in the elementary school, are apt to help pupils too much. In the higher schools one often hears a teacher require a class to study a given lesson, but seldom does one find a teacher much concerned about the method employed in satisfying this demand. Both teaching and studying are most economically accomplished when teacher or student, conscious of the learning processes, adapt themselves to these conditions imposed by the very nature of our mental life.

Guiding children successfully in the development of their mental life as indicated by acquiring knowledge, or habits, or ideals, does not involve the result so much desired of ability to continue this work independent of the help of the teacher. The method which the teacher finds successful must become the conscious tool of the pupil. The teacher who is successful merely through imitation, or by a process of trial and success cannot be expected to teach a boy how to work to best advantage for himself. One very important reason for training teachers in the theory of teaching is found in this necessity for a knowledge of the principles of learning by one who would teach others how best to use such ability as he may possess.

The only investigation of the results commonly secured, or

which we may hope to secure, in power to work independently on the part of school children is found in Dr. Lida B. Earhart's ['08] "Systematic Study in the Elementary School." Some of the results of this study are presented in the pages which follow.

It will be admitted that any possibility of adequate training for independent work depends upon the appreciation which the teacher has of the processes involved. Dr. Earhart asked a large number of teachers to answer the following questionnaire:

1. Assuming that memorizing is one of the processes employed in studying, tell how you would memorize a poem or a chapter in the Bible.
2. Many teachers when directing pupils to study, tell them *to think* about the lesson. Enumerate the various things which you think ought to be done in "thinking about a lesson."
3. Is there anything else which you think ought to be done in studying a lesson?
4. Do you do any of the things named under 1, 2, and 3 more frequently than the others? If so, which are they?
5. When you were a pupil in the Elementary School, were you taught to use any of these steps or processes systematically? If so, which ones?
6. If you have taught in an Elementary School, have you ever trained your pupils there to use any of these steps or processes? If you have, which steps or processes were they?

Some of Dr. Earhart's conclusions follow:

"It is interesting to note that at least 78% of the teachers read or study a poem or chapter before memorizing it. . . .

"Only 23.6% of the teachers report that they divide a selection into thought units in memorizing, while a much longer number use such mechanical divisions as lines, sentences, or stanzas. Again, only about 11% reported that they pictured situations, *i. e.* imagined; 13% said they traced thought relations; and less than 6% that they associated the ideas of the poem or chapter with known facts. More than one-fourth reported that in memorizing they use cumulative repetition, *i. e.* the House-that-Jack Built order of procedure, going from line to line, then back again to the beginning for a fresh start. Wherever details are given

explicitly enough to make the meaning clear, the mechanical side is seen to predominate. . . .

"Some explanation of the failure of so many pupils to work systematically and effectively may be seen in the fact that in stating the various things which they think ought to be done in 'thinking about a lesson' not more than 33 1-3% of the teachers agreed upon any one item. There were at least twenty things mentioned which should be done, and the element considered most important was indicated by one-third of the writers. This was, 'Find the important points'—a very necessary thing to do in studying, the strange part being that so few of the teachers felt its importance. A number of the other items given are either so general as to give no idea of what the writers really meant, or they are mechanical, *e. g.* apperceive, reason, understand the meaning, memorize. Only 15% felt keenly enough to mention it the necessity of finding the main thought or problem. The questions arise: If teachers do not feel the necessity of finding the problem sufficiently to speak of it in describing the process of study, will they be likely to think of it when working with pupils? . . . .

"Attention, interest, perception, apperception, imagination, memory, correlation, comparison, and reason—these make up one-third of the separate items in answer to the third question, and tell a minimum as to what is really to be done. The large number of items and the indefiniteness of many of them, show that these teachers do not clearly see the nature of study. No steps stand out strongly in the minds of a large number, but instead there is confusion of thought, and lack of agreement. . . .

"In answering the questions: Do you do any of the things mentioned under 1, 2, and 3, more frequently than the others? If so, which are they? the teachers limited the number of steps mentioned but still scattered their votes, showing the same fail-

ure to recognize essential features. Twenty-four per cent said they memorized more frequently than anything else; and as low a per cent as appears, 1.2%, represents the number who recognized the importance of finding the aim or problem. . . .

"The fifth question answered by the teachers was: When you were a pupil in the elementary school, were you taught to use any of these steps or processes systematically? If so, which ones? Eliminating those who reported definitely that they were not taught, those who did not remember, and those whose answers were not relevant—nearly 65% of the teachers, there are 35% left who say they were systematically taught. 20.6%, much more than half of this remnant, were taught to memorize, while the factors of logical study are hardly recognized at all in this report."

Dr. Earhart also calls attention to the type of assignment as indicating a lack of appreciation on the part of teachers of the necessity for a problem or aim.

"Five lesson assignments in sixth grade history were observed, and three recitations, the two exercises being separated in time. The results can be shown briefly.

1.	Total number of classes observed		5
		Classes	Per ct
2.	Lesson assigned by subject	4	80
3.	Lesson assigned by pages or paragraphs	2	40
4.	Pupils directed to references	1	20
5.	Pupils directed to ask questions	1	20
6.	Pupils directed to read lesson	1	20
7.	Pupils directed to read smoothly	1	20
1.	Total classes visited		12
		Classes	Per ct
2.	Number of assignments not observed	7	58.3
3.	Number of assignments by pages	2	16.7
4.	Number of assignments by subject	2	16.7
5.	Number of times teacher gave questions	1	8.3
	The recitations showed these details:		
1.	Total number of classes visited		12
		Classes	Per ct
2.	Number of drill or review exercises	4	33.3
3.	Number of times teacher gave outline	3	25.

		Classes	Per ct.
4.	Number of times pupils found topics	1	8.3
5.	Number of memory recitations observed	1	8.3
6.	Number of times teacher supplemented text	1	8.3
7.	Number of times pupils supplemented text	1	8.3
8.	Number of times pupils reasoned or explained	5	41.7
9.	Number of times teacher questioned	9	75.
10.	Number of recitations not observed	2	16.7

"These observations, like most of the others, reveal the teacher doing nearly all of the work, and very little initiative or opportunity for independent, constructive work left to the pupils. In not a single class did the pupils question or participate in discussion."

Dr. Earhart took a fourth grade class in literature for sixteen lessons in order to discover how much could be accomplished in that length of time toward teaching them how to study. Quotations from her description of the experiment and the results secured follow.

"The early recitations showed that the pupils responded with interest to the subject matter, and that they desired information in regard to many things, these frequently being facts which the editor had omitted. They were ready to pass judgment as to character, as for example, when they commended Nausicaa's act of kindness to Ulysses. But these lessons showed, also, that the pupils needed to look for the problems in the story; that they needed training in analysis and organization of the material; in making out the pronunciation and meaning of words, and in thinking out the meaning of sentences. The teacher found, too, that she needed to eliminate herself more thoroughly, and throw more responsibility upon the class.

"In the third lesson the pupils were asked to suggest ways for finding out the meaning of words needed in reading. Various means were presented, and at last the class decided to try to use another word in the place of the word not understood. After that lesson, they took care of meanings themselves, asking to

have a word substituted for the word which they could not understand. They grew very critical, refusing definitions and explanations, and objecting to words whose substitution did not bring understanding or satisfaction. They would say, 'You did not do what I asked you,' and more than once a pupil was told to sit down because his answer was not what had been asked for. They were attempting to satisfy needs, and were very discriminating in their judgment about words. The previously felt difficulty about synonyms disappeared whenever the need of such words was felt. . . .

"The first lesson showed that the pupils were not able to divide the lesson into parts. In the fourth lesson, they were asked to think of a good name for a certain part of the story and to write these names on paper. Out of a class of twenty, one began to write the story, and two or three did nothing. A few were absent. The rest gave the following list, which is a great gain over the first lesson:

Ulysses meets Nausicaa.
When Ulysses meets Nausicaa.
Ulysses and Nausicaa.
Ulysses speaking to Nausicaa.
Nausicaa meets the stranger which is Ulysses.
Ulysses.
Ulysses gets food and drink.
Ulysses goes to town.
Nausicaa clothes Ulysses.

"A few other similar to these were given.

"Towards the close of the series of lessons, after the pupils had read the booklet of eight pages entitled, *Penelope and Telemachus during Ulysses' Absence*, they were asked to name in order the things they would talk about if they were telling the story to some one at home. They gave the following outline very promptly:

The princes wish to marry Penelope.
Penelope deceives the princes.

Telemachus holds a council.
Telemachus goes to inquire about Ulysses.
Telemachus visits Nestor.
Telemachus visits Menelaus.
The suitors making ready to kill Telemachus.
Penelope hears of Telemachus' absence. . . .

"One example of their filling out and explaining situations was afforded by the answers to the question of a child who asked, 'How did Ulysses know that Nausicaa was the daughter of a king? He had never seen her before.' The following replies were given: (1) 'Because she stayed, although the maidens ran away.' (2) 'Because she had mules.' (3) 'Because she had maids.' (4) 'Maybe she had nice clothes.' (5) 'Maybe she wore a band of gold on her head.' At another time, a child asked, 'Why did the suitors want to marry Penelope?' One little girl gave in substance this reply: 'Because she was gentle and kind, and was not lazy, but looked after the house. She could spin, and could weave beautiful cloth. She could do her own washing.' . . .

"When the last booklet in the story of Ulysses was taken up, there was time for but one lesson with the class, so that results had to be hurried somewhat. The pupils had already stated the questions to be answered and these constituted the aims in reading this section. They were told to read through the entire booklet of eight pages silently, then to make a list of the important subjects in it, to write any questions which they would like to have answered, and any words in place of which they would like to have other words used. These papers were written by the pupils with no help whatever save in regard to spelling, use of capital letters, and punctuation. Some of the papers are here reported just as they were written.

ROSE

1. Ulysses awakens.
2. The swineherd gives food to Ulysses.
3. Telemachus goes to the swineherd's house.

4. Ulysses tells Telemachus that he is his beloved father.
5. Ulysses dines with Telemachus, and the swineherd.
6. Telemachus goes to town to see his mother.
7. Telemachus tells Penelope what had happened when he was away.
8. Ulysses goes to the palace as a beggar.
9. Penelope hears of the shameful treatment.
10. Ulysses tells Penelope what he had heard from Ulysses not long ago.
11. The nurse gives Ulysses a bath.
12. The nurse fells (feels) Ulysses scar.
13. Ulysses kills the suitors.
14. Telemachus and Ulysses goes to the house of Laertes.
15. Ulysses reigned over Ithaca as beloved as before.

Why did Ulysses kill the suitors, why did he not send them away?
Why did Ulysses go to town as a beggar, why did he not show himself?
Why didn't Ulysses tell the swineherd he was his master?
Why did Telemachus and Ulysses store the weapons in the inner rooms?
Why don't Ulysses tell Penelope that he was Ulysses instead of telling her that he has fought by Ulysses' side?
Why did Ulysses sleep, why did he not wake up and go to town?
Why did Ulysses go to the house of Laertes?

scrip
revels
threatened
dole

EARL.

1. Ulysses awakes.
2. Ulysses and the swineherd.
3. Ulysses meets Telemachus again.
4. Penelope and Telemachus.
5. Penelope and the beggar.
6. The nurse recognizes Ulysses.
7. Penelope gives a contest.
8. Ulysses tries the bow.
9. The death of the suitors.
10. Ulysses rules over Ithaca again.

Why did Ulysses go to the swineherd?
Why did Ulysses beg for his bread?
Why didn't Ulysses tell Penelope that he was her husband?
Why did Telemachus go to the house of Laertes?

procured	treachery	rumor
scrip	abusive	adjourned
thong	bower	covenant
revels	combat	reigned

"Several papers were prepared which were quite equal to Earl's and some might be considered better. The rest would grade in excellence from these down to the following one prepared by a boy who had been in class only two or three days when the exercise was given:

1. When Ulysses wakened from his sleep.
2. He bought from a sheapherd a ragged dirty clock (cloak).
3. He went to visit the swineherd.
4. As she bathed his feet she touched the scar.

"This series of lessons showed plainly that pupils in the fourth grade are capable of finding problems for themselves, of organizing the lesson, of asking intelligent questions, of forming sensible hypotheses, of exercising judgment as to the statements made by the author, of mastering formal difficulties for themselves, and, in various ways, of exercising initiative wisely and profitably. It shows, too, that when pupils work in such a way they work with zeal, and accomplish much more than is done when they must spend time upon useless details and mechanical methods of working."

§ 21. School Records and Reports

The development of adequate school records and significant school reports may be traced on the one hand to the growth of the profession of education, and on the other to the demand which the public is now making for complete information concerning public enterprises. There was a time when it was customary for school boards or school committees to make a report consisting largely in a statement of their activities in hiring teachers, building and equipping school plants, and in visiting the schools. To-day teachers are hired and schools are organized and administered by an educational expert, and in like manner school reports are an account of the results secured under the direction of the school's chief executive officer. When school boards told of their activities, the schools were relatively few and the organization simple. The reports which they rendered demanded little in the way of expert knowledge either of schools or of refined methods of recording or reporting school activities. To-day there are many people who judge of the efficiency of a school superintendent in terms of his ability to satisfy any inquiry which may be made concerning the course of study, the teachers, the pupils, or fiscal aspects of the problem with which he deals, together with any interrelation which may exist among these several parts of the whole problem.

It is not easy to distinguish between records and reports. The records which are accumulated in any one field furnish the raw material of the report which is made concerning this aspect of school practice. Original records are significant only as they are combined in such a way as to throw light upon the particular problems involved. Of course it is true that reports commonly include much discussion of school policy which is not based in

any considerable degree upon school records. However, with the demand that is being made with greater and greater frequency that any problem be supported with a statement of the results which may be expected, makes the relationship between records kept in the school system itself, or derived from other school systems, a matter of primary importance even in that part of the report which is frankly a discussion of future development. Indeed, it may well be claimed that it is a primary function of school records to make known school needs.

It is only in recent years that any considerable addition has been given to the form of the records or reports of school systems. A few years ago a report of attendance giving the total number enrolled and the average daily attendance, would probably have been considered satisfactory. In addition to the record of attendance, one would probably have found a scholarship record kept by each teacher. In the same system one would have found a very simple system of accounting and a report of expenditures distributed among a very few items, such as teachers' salaries, text-books, stationery, fuel, and possibly a few other items. Quite commonly a large part of the total amount expended was reported as miscellaneous expenses. This tendency to report in terms of totals and averages has been superseded by the demand for all of the facts. Students of education, as well as those who are interested in public enterprises, whether in education or in some other field, have come to realize that it is necessary to know the facts in terms of their distribution, showing the limits or range within which the cases considered lie, the central tendency, variability, and the like, if any adequate interpretation of the situation is to be hoped for (See article on Statistical Method). This demand for adequate statistical treatment of school facts is being met throughout the world to-day by an improved system of records and by more adequate reporting. As examples of this development, one might cite the cumulative

pupil record card, and the form for reporting fiscal statistics, which have been recently recommended by a committee of the Department of Superintendence of the National Education Association.

Five years ago there were very few cities, probably not more than thirty, in the United States who could, without very great difficulty, furnish a record of a pupil's school life from the time he entered school to the date upon which the inquiry was made. To-day there are more than two hundred cities who have reported to the committee referred to above that they are using a cumulative record card at least as adequate as the one recommended by the N. E. A. Committee. A copy of this card follows:

ELEMENTARY SCHOOL RECORD SYSTEM—PROMOTION RECORD

This card is to pass from teacher to teacher or from school to school as the pupil is promoted or transferred. It is to be filled out and sent to the principal's office when any change is made requiring a change in the office records. It is then to be sent to the teacher who has the pupil.

(a) School	(b) Date of admission	(c) Age Sept. 1		(d) Grade	(e) Room	(f) Days present	(g) Health	(h) Conduct	(i) Scholarship
		Yrs.	*Mos.*						
									(over)

(1) 1. Last name.....	(2) First name and initial.....	ELEMENTARY SCHOOL RECORD SYSTEM—ADMISSION, DISCHARGE, AND PROMOTION CARD.
(3) Place of birth.....	(4) Date of birth / (5) Vaccinated	To be kept for every pupil and sent with the pupil when he is transferred to any school, either public or private, in the city or outside the city. Great care should be used to have the names complete and correct. Write all dates as follows. 1912-9-25.
(6) Name of parent or guardian.	(7) Occupation of parent or guardian.	

(8) Residence. (Use one column at a time. Give new residence when pupil is transferred.)		(9) Date of discharge	(10) Age	
			Yrs.	*Mos.*
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

When a pupil is permanently discharged to work, to remain at home, or because of death, permanent illness, or commitment to an institution, this card is to be returned to the principal's office and a full statement of the cause of the pupil's discharge is to be made in the blank space remaining above.

8-304 (over)

A cumulative record card similar to the one given above should be kept for every child throughout his entire school career. From such a pupil record it will be possible at any time during the pupil's attendance in public schools to determine: 1. The amount of attendance of individual pupils for one year; 2. comparative rates of progress in schools having school terms differing in length; 3. classification of pupils by age and grade; 4. classification of pupils for enrollment date (a) duplicate enrollment in the school, (b) duplicate in other public schools in the same

town or city, (c) duplicate enrollment from other public schools in the same city, (d) original enrollment from all other sources; 5. the number of times a child has been detained in a grade; 6. foreign birth or parentage as affecting progress; 7. kindergarten training as affecting progress; 8. transfers as affecting progress; 9. the effect of attendance (or absences) on progress; 10. inquiries having to do with individual school management, as well as many other valuable and interesting facts about school children.

The demand for better fiscal statistics is well illustrated by the form recommended by the National Education Association Committee, which follows:

A. PAYMENTS

I. EXPENSES (COST OF CONDUCTING SCHOOL SYSTEM)

	Total	Salaries	Other objects
EXPENSES OF GENERAL CONTROL (OVERHEAD CHARGES)			
1. Board of education and secretary's office			
2. School elections and school census			
3. Finance offices and accounts			
4. Legal services			
5. Operation and maintenance of office building			
6. Offices in charge of buildings and supplies			
7. Office of superintendent of schools			
8. Enforcement of compulsory education and truancy laws			
9. Other expenses of general control			
10. Total			

	Total	SCHOOLS AND SPECIAL ACTIVITIES							
		DAY SCHOOLS		EVENING SCHOOLS					
		Elementary, including kindergarten	Secondary (high)	Elementary	Secondary	Normal schools	Schools for the industries	Special schools	Special activities
EXPENSES OF INSTRUCTION									
11. Salaries of supervisors of grades and subjects									
12. Other expenses of supervisors									
13. Salaries of principals and their clerks									
14. Other expenses of principals									
15. Salaries of teachers									
16. Textbooks									
17. Stationery and supplies used in instruction									
18. Other expenses of instruction									
19. Total									
EXPENSES OF OPERATION OF SCHOOL PLANT									
20. Wages of janitors and other employees									
21. Fuel									
22. Water									
23. Light and power									
24. Janitor's supplies									
25. Other expenses of operation of school plant									
26. Total									

A. PAYMENTS—*Continued*

I. EXPENSES (COST OF CONDUCTING SCHOOL SYSTEM)—*Continued*

	Total	Schools and Special Activities							
		Day Schools		Evening Schools		Normal schools	Schools for the industries	Special schools	Special activities
		Elementary, including kindergarten	Secondary (high)	Elementary	Secondary				
EXPENSES OF MAINTENANCE OF SCHOOL PLANT									
27. Repair of buildings and upkeep of grounds									
28. Repair and replacement of equipment									
29. Insurance									
30. Other expenses of maintenance of school plant									
31. Total									
EXPENSES OF AUXILIARY AGENCIES									
LIBRARIES									
32. Salaries									
33. Books									
34. Other expenses									
PROMOTION OF HEALTH									
35. Salaries									
36. Other expenses									
TRANSPORTATION OF PUPILS									
37. Salaries									
38. Other expenses									
39. Total									
MISCELLANEOUS EXPENSES									
40. Payments to private schools									
41. Payments to schools of other civil divisions									
42. Care of children in institutions									
43. Pensions									
44. Rent									
45. Other miscellaneous expenses									
46. Total									

A. PAYMENTS—*Continued*

II. OUTLAYS (CAPITAL ACQUISITION AND CONSTRUCTION)

47. Land									
48. New buildings									
49. Alteration of old buildings									
50. Equipment of new buildings and grounds									
51. Equipment of old buildings, exclusive of replacements									
52. Total									

III. OTHER PAYMENTS

53. Redemption of bonds	$
54. Redemption of short-term loans	
55. Payment of warrants and orders of preceding year	
56. Payments to sinking funds	
57. Payments of interest	
58. Miscellaneous payments, including payments to trust funds, textbooks to be sold to pupils, etc.	
59. Total	
60. Balances at close of year at	$
61. Total payments and balances	

B. RECEIPTS

REVENUE RECEIPTS

62. Subventions and grants from State	$
63. Subventions and grants from county	
64. Subventions and grants from other civil divisions	
65. Appropriations from city treasury	
66. General property taxes	
67. Business taxes (licenses, excise taxes, taxes on corporations, taxes on occupations, etc.)	
68. Poll taxes	
69. Fines and penalties	
70. Rents and interest	
71. Tuition and other fees from patrons	
72. Transfers from other districts in payment of tuition	
73. All other revenue	
74. Total revenue receipts	

NON-REVENUE RECEIPTS

75. Loans and bond sales	$
76. Warrants issued and unpaid	
77. Sales of real property and proceeds of insurance adjustment	
78. Sales of equipment and supplies	
79. Refund of payments	
80. Other non-revenue receipts	
81. Total non-revenue receipts	
82. Total receipts	
83. Balances at beginning of year	
84. Total receipts and balances	

C. VALUE OF SCHOOL PROPERTIES

CLASS OF BUILDINGS	Total Value of Sites, Buildings, and Equipment	Value of Sites and Buildings	Value of Equipment	Interest on Value of School Plant
General control				
Elementary schools				
Secondary schools				
Normal schools				
Schools for the industries				
Special schools				

A few years ago very few cities could have distributed their expenditures in any such manner as is indicated in this form. It was not common either to indicate as clearly as is demanded above, the purpose for which money was spent, nor the particular type of institution or activity for which money was used. There are to-day four hundred and eighteen cities reporting to the N. E. A. Committee that their system of accounting enables them to give reports at least as adequate as that indicated in this form. This means, of course, that there has been in recent years an increased addition to the business aspect of school administration. In many cases it means that a special officer, variously called a business manager, a secretary, a controller, or a school auditor, has been added to the staff employed by the Board of Education.

Further illustration of the more adequate form of report may be indicated by calling attention to forms of reporting now commonly used in our school reports. It was not unusual a few years ago to have school salaries reported as a single item. Manifestly the truth about salaries can be known only when we know how many teachers receive each of the several salary amounts, as indicated in a table like the following. Tables of this kind are not now uncommon. See Table 84.

TABLE 84

Number of Elementary-school Teachers with Salaries—		Number of High-school Teachers with Salaries—	
Below $350		Below $500	
$350 to 400		$500 to $600	
400 to 450		600 to 700	
450 to 500		700 to 800	
500 to 550		800 to 900	
550 to 600		900 to 1,000	
600 to 650		1,000 to 1,100	
650 to 700		1,100 to 1,200	
700 to 750		1,200 to 1,300	
750 to 800		1,300 to 1,400	
800 to 850		1,400 to 1,500	
850 to 900		1,500 to 1,600	
900 to 950		1,600 to 1,700	
950 to 1,000		1,700 to 1,800	
1,000 to 1,050		1,800 to 1,900	
1,050 to 1,100		1,900 to 2,000	
1,100 to 1,150		2,000 and above	
1,150 to 1,200			
1,200 and above			

Any adequate study of school organization involves a consideration of the distribution of children by ages and grades. An age grade table, such as is given below in Table 85 is now commonly found in school reports.

TABLE 85

DISTRIBUTION OF ENROLLMENT AT DATE OF THIS REPORT, BY AGES AND GRADES [1]

AGES	GRADES																							
	First			Second			Third			Fourth			Fifth			Sixth			Seventh			Eighth			Total		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
6 years																											
7 years																											
8 years																											
9 years																											
10 years																											
11 years																											
12 years																											
13 years																											
14 years																											
15 years																											
16 years																											
17 years																											
18 years																											
19 years																											
20 years																											
Total by grades																											
Below normal age																											
Normal age																											
Above normal age																											

1 Give age Sept. 1.

Instead of the reports which give the average daily attendance of pupils, we are coming to have reports which tell the whole truth about attendance by distributing the number of days attended as is indicated in Table 86.

TABLE 86

DISTRIBUTION OF ATTENDANCE

TIME	Boys	Girls	Per Cent of Whole Number
Attending less than 10 days			
" 10 days to 19 days			
" 20 " 29 "			
" 30 " 39 "			
" 40 " 49 "			
" 50 " 59 "			
" 60 " 69 "			
" 70 " 79 "			
" 80 " 89 "			
" 90 " 99 "			
" 100 " 109 "			
" 110 " 119 "			
" 120 " 129 "			
" 130 " 139 "			
" 140 " 149 "			
" 150 " 159 "			
" 160 " 169 "			
" 170 " 179 "			
" 180 " 189 "			
" 190 " 199 "			
Total (equal enrollment for term)			

In like manner tables which give enrollment, promotions and non-promotions by grade and by causes, failures by subjects and by grades, withdrawals by ages, by grades, and by causes, are becoming more and more common in school reports.

On the side of fiscal statistics, we are beginning to have reports which attempt to analyze expenditures in such a way as to show the total cost per pupil in various grades or types of schools, the cost per pupil for various items, such as instruction, books and supplies, fuel, and the like, and in some cases a careful analysis and comparison is made of costs among the several units of the

school system, as, for example, upon the basis of school buildings or plants.

In the newer type of report, it is common to illustrate with charts, diagrams, and pictures. There is an attempt made to tell the story in such a way as to interest the reader, as well as to convey information to the specialists. In some cities definite plans are made for publicity through the newspaper, or in some cases by issuing partial reports on special subjects of interest from time to time throughout the school year.

Another interesting development in modern reports is the appreciation of the fact that it may not be wise to attempt to cover every subject with equal completeness each year. It may be argued that the best report is the one which specializes upon some one aspect of the school problem once in three or once in five years. Of course it is necessary, if such a cycle of reports is instituted, to give the essential facts each year. If, for example, the following cycle were followed, first year, curriculum, including special schools and special classes; second year, finance; third year, pupils; fourth year, teachers; fifth year, buildings and equipment, the report would undoubtedly convey certain information concerning each of these fields each year. On the other hand, in each of the five years the topic which was considered the special order for the year, would be treated exhaustively. In so far as statistics or reports are valuable for the guidance of those who administer our schools, there would be great advantage in the adoption of some such plan as indicated above. To have an exhaustive treatment of a topic once in five years would be just as satisfactory as to have the topic treated with like fullness each year. Since space and effort must be economized, there is manifestly a very great advantage in treating in successive years several different topics, and then returning to treat each of these topics again after the lapse of a definite period.

Possibly the most interesting development in recent years is

found in the demand for uniformity in recording and reporting. Our state education officers have demanded uniform reports within the city. For the most part, these reports have been very inadequate, and have been thought of as significant mainly in so far as the information derived was used as a basis for determining the aid given to the local community from the state. The movement for uniformity, which has taken form in the National Education Association in the appointment of a special committee on uniform records and reports, may be expected in time to affect the state officers as well as city school systems. This committee has, since its appointment, worked in coöperation with the United States Bureau of Education, the Census Office, and the Association of School Accounting Officers. These four bodies have agreed upon a uniform program. The United States Bureau of Education has from time to time modified its schedules in accordance with the recommendations of the joint committee. The Bureau has also invited state and city superintendents for conferences, and has sent out its forms for criticism to city and state officers before issuing them in permanent form. It is to be expected that from this campaign of education there will come a realization of the importance of uniformity as well as greater interest in records and reports.

Hope for more adequate recording and reporting is to be found, too, in the increased demand made upon those who would enter the profession. Courses in school management and in school supervision and administration in normal schools and colleges, are to-day sending students into the field with some appreciation of statistical method, and with some acquaintance with the best practice with respect to records and reports. The movement for adequate records and reports is a part of the development of a science, as well as of a profession of education. The demand upon the part of the public for such adequate information is even greater than the demand for efficiency in teaching.

PART V

SCHOOL FINANCES

§ 22. City School Expenditures

The financial problem in connection with our public schools is fundamental. We may devise improved courses of study, we may provide for the proper training of teachers, our aim may be sound and our method well grounded, and still we must have the money to build and properly equip and maintain buildings, to provide the necessary books and supplies, to hire the competent supervisors and teachers, or all will count for naught. We believe that our schools have advanced in this country during the past fifty years, and we know that along with this advance the amount of money spent for public education has increased in a ratio altogether out of proportion to the number of people educated. Still further, we believe that those sections of our country which to-day spend the most money for public education are the sections which are doing the best work. Especially with the growth of cities and the great increase of urban population has the amount of money spent for public schools grown larger. But even the great increase in expenditure, amounting in some cases to ten- or even twenty-fold during the past fifty years, has not been sufficient to satisfy the demands of those who believe in the efficacy and necessity of public education in our modern democracy.

President Eliot, in his address before the Connecticut State Teachers' Association in 1902, argued for more liberal expenditures for public education, in order that we might accomplish by this means certain desirable ends which we have as yet failed to attain. He sums up his argument in one part of his address as follows: "My first argument in support of this proposition is that, as a nation and on the whole, in spite of many successes, we have met with many failures of various sorts in our efforts to educate the whole people, and still see before us many unsur-

mounted difficulties. It is indisputable that we have experienced a profound disappointment in the results thus far obtained from a widely diffused popular education. It was a stupendous undertaking at the start, and the difficulties have increased with every generation. Our forefathers expected miracles of prompt enlightenment; and we are seriously dissappointed that popular education has not defended us against barbarian vices like drunkenness and gambling, against increase of crime and insanity, and against innumerable delusions, impostors, and follies. We ought to spend more public money on schools, because the present expenditures do not produce all the good results which were expected and may reasonably be aimed at." [1]

In a second address to the New Hampshire State Teachers' Association in the same year, President Eliot maintained that more money should be given to the public schools, because of the great gains that have been made in public education. Some of the improvements to which he called attention were the establishment of kindergartens, improvement in the curricula of elementary schools, increase in the number of high schools, improvement in school buildings, new kinds of schools (manual training, the mechanic arts high school, the evening school, and the vacation school), improvement in normal schools, improved methods of selecting and appointing teachers, pensions for teachers, increased employment of educational experts in supervising and executive functions of urban school systems, the increased use of high schools, the introduction of the costly elective system, better university teachers, improved professional training, increased opportunity for the higher education of women, and increased attention given to the welfare of the body. Every one of these educational improvements, says President Eliot, "has been costly; but every one has justified itself in the eyes of the taxpayers, or of those who voluntarily pay for it; not one would now

[1] Eliot, *More Money for the Public Schools*, p. 23.

be recalled, and the total result encourages the expectation that large new expenditures would commend themselves to the people at the start, and in the end would prove to be both profitable in the material sense and civilizing in the humane sense.

"You have doubtless noticed that the gains I have reported are chiefly in education above fourteen years of age. There has been improvement in the first eight grades since 1870, but it is relatively small. Yet the great majority of American children do not get beyond the eighth grade. Philanthropists, social philosophers, and friends of free institutions, is that the fit educational outcome of a century of democracy in an undeveloped country of immense natural resources? Leaders and guides of the people, is that what you think just and safe? People of the United States, is that what you desire and intend?" [1]

There is nothing unusual nor radical in this appeal of President Eliot. In almost every educational journal one can find arguments for increased expenditures for teachers' salaries. In many states laws have been passed or proposed which declare that all text-books shall be furnished free to children. In every community new school buildings are built better than the old. More attention is given to proper heating, lighting, and ventilating. All this means an increase in school expenditures. Along with this great increase in expenditure and with the demand for still greater sums of money for public education, there has arisen the necessity for greater ability in the handling of school moneys, and, on the part of the tax-payers who furnish the money, a desire to know how the money is spent and what results are obtained.

Those who have controlled our free public schools have always had the double function of attending to the business affairs of the school system, as well as looking after the matter of instruction. In the early days, when the chief expenditure was for the teacher's salary and there were very few other items of expense, it was a

[1] Eliot, *More Money for the Public Schools*, pp. 125–127.

comparatively simple matter to administer the finances of the then small schools systems. With the great growth of cities and school systems, together with the enormous increase in amount and variety of expenditures, the problem of business administration has become very complex. This demand for expert ability in dealing with the business affairs of the schools has been met in different ways. In some instances a special committee of the school board or committee has been given charge of the financial affairs of the schools. In many cases the superintendent has not only supervised instruction, but has also been the business manager for the school system. In other cases, notably in Cleveland and Indianapolis, a special executive officer has been provided to look after the business affairs. There is a growing feeling that the business affairs of the large school systems demand expert ability, and that it is financially profitable for a large city to employ a business director to look after the financial interests of the school system. The Chicago Commission, appointed in 1898, recommended that the function of the school board "be chiefly legislative, the executive work being delegated to the superintendent and business manager."[1] However desirable it may be to have a special executive officer whose duty it shall be to look after the business affairs of the schools, the fact remains that in vastly the greater majority of cities of over ten thousand inhabitants this work is now done by the school board, by the superintendent of schools, or by the board and the superintendent in coöperation with each other.

In the year 1899 there reported to the Department of Superintendence of the National Educational Association the Committee on Uniform Financial Reports, which had been appointed at the previous meeting. Something of the purpose for which this Committee was appointed, as well as their recommendations, may be found in the following quotation:

[1] *Report of the Chicago Educational Commission.*

"While local conditions enter into the necessities for expense in any public school system, yet one of the most useful means of estimating proper expenditures should be afforded by a study of the financial school reports of other similar cities or districts. As these reports are at present made, they are of little use in this respect. Items given in one report are omitted from another. Items of income and outgo are differently grouped in different reports, and the statement is made in such a way that it is impossible to separate the items for the purpose of re-classification. In getting the cost of education per child, different items are put into the total cost of education, which forms the dividend, while the divisor is sometimes the number enrolled, sometimes the average number in daily membership, sometimes the average number in daily attendance.

"One of the chief studies of a wise administrator of schools is to make the cost of education per child as low as is consistent with the best service. Attention to this and to the comparative study of the reports for a period of years, now that most of our school systems are established on a somewhat similar plan, should give an idea of the average or normal cost of education per child. Having this, the manager of schools may know how expense in his system differs from this normal standard and, if not normal, why it is above or below. This knowledge cannot be arrived at, however, until the same items are included when comparing cost of education, and the same divisor is used when obtaining the average. By careful comparative study, railroad men know the average cost of hauling freight per ton per mile, and the cost per mile of transporting a passenger. Those administering schools should be as well informed upon the cost of education."[1]

During the past five years there has been much discussion concerning the efficiency of those charged with the control of our

[1] *Proceedings of the National Educational Association*, 1899, p. 345.

municipal activities. There have been investigations of various city departments, budget exhibits and surveys. Our schools have come in for their share of these investigations. There has developed a demand for adequate records and reports, for the standardization of supplies and for definite units of cost for various educational activities.

At the meeting of the department of superintendence of the National Education Association in Indianapolis in 1910, a committee on uniform records and reports was appointed. This committee made its final report at St. Louis in 1912. Among other recommendations, a form for reporting fiscal statistics was submitted. This schedule was prepared by the committee of the department of superintendence acting in coöperation with the United States Bureau of Education, the Census Office, and the National Association of School Accounting Officers. Many of the more progressive cities have already introduced systems of accounting which will make possible a report at least as detailed as is called for by the form recommended. This schedule is sent to all of the larger cities by the Bureau of Education in asking for a report of fiscal statistics.[1]

During the years 1903–1905 inclusive the writer made an investigation of city school expenditures. The data which furnish the basis of this study were secured from fifty-eight cities of between ten and fifty thousand inhabitants, located in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey. To the superintendent of schools in each city the following blank form was sent.

[1] This schedule will be found on pp. 255–258.

TEACHERS COLLEGE
COLUMBIA UNIVERSITY
NEW YORK

Data for research in Educational Administration. School Expenditures for the year 190 *and* 190 *, in the city of* ..... *state of* .....

		$	
I. Current Expenses:			
1. Salaries for supervision (Superintendent, Assistant, Deputy, or Associate Superintendents, and Principals)		.....	....
2. Salaries for business administration (salaries of members of the Board of Education, Business Manager, Superintendent of Buildings and Grounds, Clerks to Board of Education, etc., etc.)	No.	.....	....
3. Salaries of Janitors (number and aggregate of their salaries)	....	.....	....
4. Salaries of Matrons or Maids in connection with Kindergartens and Baths (number and aggregate of their salaries)	....	.....	....
5. Salaries of Truant Officers (number and aggregate of their salaries)	....	.....	....
6. *Salaries for Teaching:*			
Number of Elementary School (Primary and Grammar) Teachers and aggregate of their salaries	....	.....	....
Number of High School Teachers and aggregate of their salaries	....	.....	....
Number of Kindergarten Teachers and aggregate of their salaries	....	.....	....
Number of Evening School Teachers and aggregate of their salaries	....	.....	....
Number of Truant School Teachers and aggregate of their salaries	....	.....	....
Number of Teachers' Training School Teachers and aggregate of their salaries	....	.....	....
Number of Special Teachers or supervisors of special subjects (Manual Training, Cooking, Sewing, Drawing, Music, Nature Study, Penmanship, Physical Education, etc.) and aggregate of their salaries	....	.....	....
Number of Vacation School and Play Ground Teachers and aggregate of their salaries	....	.....	....
What are the daily wages of (1) Carpenters, $..... (2) Bricklayers, $.....(3) Day Laborers, $..... in your city?		.....	....
7. Text-books, including copy- and drawing-books and repairs to books		.....	....
8. Supplies consumed by pupils (paper, pencils, ink, chalk, pens and pen-holders, erasers, laboratory, manual training, cooking, and kindergarten *supplies*, etc., etc.)		.....	....
9. Janitors' Supplies (brooms, brushes, towels and washing of towels, toilet paper, soap, etc., etc.)		.....	....
10. Supplies for Board of Education, Superintendents', and Principals' offices		.....	....

TEACHERS COLLEGE—*continued*

11. Fuel		
12. Light and Power		
13. Water		
14. Ordinary repairs to Buildings and Grounds		
15. Rent		
16. School Census		
17. Transportation of Pupils		
18. Insurance		
19. Freight and Expressage		
20. Printing and Advertising		
21. Telegraph, Postage, etc		
22. Telephone		
23. *Other Current Expenses:*		
Are books furnished free to indigents?.....to all students?.....What supplies are furnished free to indigents?		
.....to all students?		
II. Plant and Permanent Equipment:		
1. New buildings and sites, furniture and furnishings *for new buildings*, and permanent improvements to buildings and grounds		
2. Furniture (exclusive of that put in new buildings)		
3. Permanent equipment or apparatus (scientific apparatus, tools or apparatus for manual training and cooking, typewriters for commercial departments, maps, charts, globes, etc., etc.)		
4. Reference and Library Books		
III. Paid on Principal of Bonded Debt		
IV. Paid on Principal of Loans		
V. Paid for Interest		
VI. All other Expenditures: (If important expenditures have been omitted in the above classification, will you kindly itemize such expenditures below.)		
Total Expenditures for the year:		
VII. Bonded School Debt at the end of the year		
VIII. Paid for Evening Schools [total current expenses, included in (I) above]		
IX. Paid for Teachers Training School [total current expenses, included in (I) above]		

The study based upon the data collected, fifty-eight cities from which reports were received the first year and from thirty of the same cities for which a second year's report was received is summarized in the tables and diagrams which follow.[1]

Of the fifty-eight cities reporting the first year, thirty were able to report their total expenditure under the classification given, without resorting to the use of the ambiguous heading "miscellaneous." Of the remaining twenty-eight cities, sixteen reported less than 2% under the head "miscellaneous"; ten others reported less than 5%; and the remaining cities reported 5.14% and 6.75% for unclassified expenditures. For the second year, of the thirty cities reporting, eighteen report nothing under "miscellaneous"; and of the remaining twelve, eight report 1% or less, three 2%, and one 3.76% under this head.

In order to compare the expenditures in the different cities with but two years' data, it seemed best to base all comparisons upon the cost of maintenance and operation, that is, the expenditures which are absolutely necessary in order to keep the schools going, together with the amount spent for keeping the plant in proper repair. Under this head we included furniture put into old buildings, that is, new furniture put in to replace old; and also money spent for apparatus and for reference and library books. These expenditures, we believe, are properly classified as expenditures for maintenance and operation, since they seldom represent any very large increase in permanent equipment. In the printed form given above, they were placed under "plant and permanent equipment," because the writer believed that it was customary to place them there and that proper returns could be most easily secured by classifying them in this way. To have taken into consideration the amount spent for new buildings or grounds, or for permanent improvements, would have been

[1] The complete original data will be found in Strayer's "*City School Expenditures*" published by the Bureau of Publications, Teachers College, Columbia University.

unfair to some cities, because in some cases a much larger proportion of such expenditures is met by an issue of bonds than in others. The item of interest is not included in the cost of maintenance and operation for a similar reason. This item is sometimes included in the public school budget, while in other cases it is paid by the city. On this point the National Educational Association Committee on Uniform Financial Reports says:

"Expenditures seem to fall into three classes: the usual current expenditures necessary for the maintenance of schools; expenditures for sites, buildings, permanent improvements and equipment; other expenditures which, for various reasons, are not put in either of the two preceding classes.

"For the purpose of this report the first of these classes is by far the most important, for it would probably be conceded that from this item of current expense should be determined the cost of education per child, the most important item to be shown."[1]

After having determined the classification to be used, and that the total expenditures for maintenance and operation should serve as the basis for comparison, the question which next arises is, "How shall the separate items be compared as among the different cities?" It has been common to compare the expenditures for different cities on the basis of the cost per pupil in daily attendance. We shall use this method, and, in addition, it seems well to compare the different items on a slightly different basis, namely, the cost per pupil based upon a figure half-way between the average daily attendence and the average daily enrollment. In discussing this point, the National Educational Association Committee on Uniform Financial Reports says:

"For many reasons No. 39" (average number in daily membership, all schools) "seems the most suitable divisor. If computed in a uniform manner, the figures showing number in average daily membership would most nearly show the requirements for

[1] *Report of the National Education Association*, 1899, p. 347.

school rooms, furniture, supplies, and teachers. But it is not true that these figures are obtained by the same process, or based upon the same facts, in the different school systems. Usage varies so in computing membership in different schools—pupils in some cases being counted as members of the schools, when in other cities the same state of facts would cause the child to be considered as no longer a member of the school—that fair comparison is apparently not practicable by the use of this divisor.

"Your committee is of the opinion that a divisor as little subject to misunderstanding as possible, and one based upon facts which are obtained in the same way everywhere, is of the first importance. The members believe that this is provided by item 40, average number in daily attendance, all schools, and we have, therefore, made that item the divisor to be used, in connection with items 12 and 13, to obtain what shall be known as the 'cost of education.' "[1]

The school must provide teachers, buildings, and equipment for more than the average daily attendance, and yet it is seldom that provision is made for a number equal to the average daily enrollment. It seems, therefore, that the figure half-way between the two is a better figure than either of the others. It was impossible to secure the figures for the average daily enrollment in some cases, and for this reason the average cost per pupil for the first and second year will be based upon the average daily attendance, even though we do not believe it is so good a figure as the other.

Still another basis for comparison recommends itself—the apportionment of money spent for specific purposes expressed in per cents of the total expenditures for maintenance and operation. This last classification offers a particularly interesting basis for comparison and is entirely free from obscurity. The question is simply one of distribution of the money that is spent

[1] *Report of the National Educational Association*, 1899, pp. 349–352.

among the several items of the budget. Just as an individual may spend too much for clothes, for food, for books, or for amusement, in the same manner it is possible for a city to spend too great a proportion of its money for janitors, for fuel, for school supplies, or even for supervision.

TABLE 87

The average of the amounts spent for each item for two years expressed as per cents of the average total expenditure for two years. Thirty cities, for the school years 1902–03 and 1903–04.

Number of City	Teaching and Supervision	Supervision	Janitors' Salaries	Teaching	Text-books and Supplies	Fuel	Repairs
5	75.4	2.2	6.7	73.2	5.2	7.1	.9
6	71.0	4.4	6.0	66.7	6.6	6.0	6.5
8	72.5	8.4	6.0	64.0	6.0	5.7	3.6
13	72.8	15.4	6.3	59.4	5.3	6.6	2.5
14	68.4	4.9	7.4	63.4	5.6	8.1	5.9
15	74.7	8.9	6.3	65.8	6.7	6.2	2.8
16	75.5	7.6	6.6	67.9	5.6	6.1	3.5
20	74.6	2.6	5.3	72.2	4.4	8.6	3.0
27	68.1	12.6	7.6	55.9	7.0	3.5	3.6
28	69.7	3.9	7.1	65.8	3.4		
29	65.7	3.0	7.7	62.8	6.9	5.6	2.1
30	70.5	2.6	6.3	67.8		4.6	8.3
31	64.0	2.7	6.6	61.2		11.2	7.8
32	65.4	10.1	6.4	55.3	2.8	6.3	7.1
34	68.6	4.4	9.4	64.2		6.8	3.3
35	76.7	3.8	5.7	72.9	.3	5.9	3.8
36	80.8	17.2	3.6	62.6	.7	5.8	1.2
37	76.2	17.2	5.2	59.2		6.9	3.4
39	73.9	11.9	5.4	62.1		6.5	4.1
40	68.1	11.1	3.8	57.0	6.1	7.3	3.6
41	70.0	9.1	4.5	60.9	5.6	6.7	1.8
42	69.8	15.7	5.2	54.1	9.1	5.1	3.1
43	72.0	3.3	6.4	68.7	3.3	5.9	2.7
45	71.2	4.3	5.5	66.9	6.1	3.9	5.9
48	68.5	12.1	5.7	57.4	6.3	5.6	2.7
52	62.4	6.1	6.4	56.2	7.3	3.6	9.8
54	65.4	11.3	5.4	54.0	13.2	4.8	3.5
55	69.2	4.8	5.6	64.4	5.8	5.1	2.0
56	71.2	10.3	8.3	60.9	3.8	4.4	4.4
57	74.5	9.7	5.1	64.8		3.9	4.2

TABLE 88

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

Number of City	Total	Teaching	Supervision	Clerk	Janitors	Truant Officers	Text-books	Supplies	Janitors' Supplies	Board of Education and Supervisors' Supplies	Fuel	Light and Power	Water
1	34.18	21.38	.99	.17	2.26	.14	1.75	1.13	.30	.03	1.56	.16	
2	26.48	16.69	.88	.07		.15	1.17	.29	.13		4.39	.12	.06
3	27.09	18.47	1.08		1.91			1.66	.27		1.27		
4	30.91	19.73	3.33	.11	2.21	.08	1.05	.89	.22		1.48	.07	.12
5	32.30	23.70	.72	.17	2.13	.25		1.94	.05	.08	1.97	.16	
6	26.80	19.50	1.12		1.41			1.75	.05	.03	1.10	.07	
7	21.19	12.65	1.68	.10	2.01	.18	.53	.79	.18		.78		
8	29.80	17.29	4.04		1.81	.37	1.48	.44	.05	.10	1.74	.05	.10
9	29.29	19.50	.82	.32	2.19	.15		1.96			2.75		.16
10	41.21	30.40	.70	.28	2.44	.19	.95	1.34	.10	.17	1.75	.08	.22
11	27.90	13.90	3.23	.31	2.56	.31		1.88			1.70	.17	
12	28.28	18.12	2.58		2.14	.07	.82		1.06		1.99		
13	28.53	15.33	4.96	.18	1.96	.27	.74	.81	.07		1.88	.05	1.6
14	27.35	17.02	1.37		1.86	.07	.85	.68	.07		2.24	.14	
15	24.33	17.20	.52	.12	1.47	.04	.97	.97	.06		1.64	.07	
16	27.67	18.65	2.16		1.77	.38	.80	.92			1.40		
17	34.88	21.90	2.73	.21	2.45	.14	1.02	1.07		.01	2.56	.28	
18	34.59	24.39	1.55		2.35	.08		2.62			2.23		
19	27.78	17.50	.95	.18	1.90	.04	1.32	.79			2.00		.11
20	22.53	16.13	.48		1.16	.15	.54	.35	.04		2.23	.03	.20
28	28.44	18.55	1.11	.36	2.05	.18		1.07			2.14		1.29
29	27.91	17.20	.81		1.95	.09		1.91	.32		1.43	.01	.08

TABLE 88 (*Continued*)

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

Number of City	Repairs	Rent	School Census	Transportation of Pupils	Insurance	Freight and Expressage	Printing and Advertising	Telegraph, Postage, etc.	Telephones	Miscellaneous Expenses	Furniture (not put in new buildings)	Apparatus	Reference and Library Books
1	1.80	.01	.24	.70		.15	.10	.02	.10	.56	.14	.45	.02
2	1.42	.04	.04	.90					.01		.13	.07	
3	1.05									1.23	.14		
4	1.03	.05	.02			.05	.03	.01	.09		.10	.26	
5	.32		.10	.34					.01		.10	.16	.08
6	1.06			.40	.05	.04	.01	.01				.19	
7	1.40		.02	.44	.18	.03	.09	.01			.06		
8	1.12		.05	.54	.18	.04	.07	.02	.03		.12	.07	.05
9	.04		.04						.02	1.34			
10	2.18		.05	.18			.10		.01				
11	1.19	.14		.26	.26	.03	.04		.05	1.89	.07		
12	9.9	.06	.04	.27		.04			.06				
13	.74	.04	.03	.14	.46	.05	.05	.01		.36	.13	.06	.01
14	1.93	.03	.02	.44		.09	.05			.16	.20	.10	.05
15	.67	.17	.03	.21		.03	.05	.01	.01		.02	.07	.01
16	1.11		.05	.10									
17	1.39		.03	.35		.07	.12	.01	.03	.08	.12	.24	.07
18	.95	.05		.24		.04	.08	.02	.02				
19	1.58		.06	.79		.05	.05	.01	.01		.16	.34	
20	.83	.08		.07			.05		.01	.21			
28	———	.13	.12						.05	.83	.22	.33	
29		2.98	.06	.34	.13	.10						.33	.17

TABLE 88 (*Continued*)

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

Number of City	Total	Teaching	Supervision	Clerk	Janitors	Truant Officers	Text-books	Supplies	Janitors' Supplies	Board of Education and Supervisors' Supplies	Fuel	Light and Power	Water
30	35.41	23.92	.96	.26	2.24	.32	.61	.98	.24		1.75	.07	
31	26.82	15.20	.76	.27	1.77	.30	1.50				3.36	.09	
32	33.50	18.52	1.25	.29	1.88	.17	.36	.63	.13	.63	2.19	.25	
33	24.13	16.31	3.08	.34	1.48	.09		.17	.04	.03	1.20	.04	
34	35.20	22.65	1.52	.42	2.82	.55	.02	.32	.21	.14	3.54	.08	
35	24.08	17.55	.48	.17	1.57	.17	.02		.09	.06	1.36	.06	
37	18.55	10.96	3.13	.37	.98	.09		.38			1.11		
38	22.68	14.65	1.69		.87	.37	.05	.09	.15	.05	1.25		
39	30.87	19.24	3.42	.30	1.61	.24		.54	.24		2.03		
40	33.61	21.08	1.36	.43	1.33	.28	.58	1.40	.11		2.95		.24
41	23.77	15.41	1.00	.44	1.09	.02	1.35		.03	.01	1.44	.11	.21
42	28.23	15.31	4.39	.32	1.48	.32	1.42	1.11	.16		1.58		.32
43	25.14	16.39	.89	.16	1.67	.20	.47	.43	.17	.03	2.23	.09	.15
44	25.50	16.22	1.16	.16	1.54	.22	.30		.03	.39	2.55	.12	.21
45	27.14	18.20	.61	.05	1.45	.18	1.48	.33	.08	.05	1.03	.25	
46	39.40	24.23	4.47	.29	1.81	.20	1.13	.68	.37	.18	1.55	.05	.13
47	18.33	5.11	2.98	.66	1.55	.16	.61		.51		2.95	.11	.04
48	21.09	12.28	2.06	.23	1.26	.28	.90	.29	.05	.04	1.29	.05	.11
49	20.93	13.40	2.54	.14	.85	.28	1.09	.21	.14	.07	1.15		.04
51	29.83	19.60	4.14	.30	1.63	.20	.56	.14	.07	.02	1.76	.03	
53	29.61	19.82	3.62	.21	2.04			1.44		.29		.83	
54	52.75	35.07	5.64	.67	2.92		2.02	2.40	.42	.17	2.61	.56	
55	19.61	12.08	.66	.11	1.04	.22	1.09				1.09	.11	
56	27.12	14.82	4.42	.22	2.28	.08	.43	.50	.32	.46	1.18	.11	
57	51.49	33.36	5.11	.96	2.43		1.35	2.24	.11	.11	2.02	.22	
58	20.38	12.83	1.97	.13	1.11			1.32	.26	.13	.66	.05	.09

TABLE 88 (*Continued*)

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

Number of City	Repairs	Rent	School Census	Transportation of Pupils	Insurance	Freight and Expressage	Printing and Advertising	Telegraph, Postage, etc.	Telephones	Miscellaneous Expenses	Furniture (not put in new buildings)	Apparatus	Reference and Library Books
30	2.61		.02				.21		.11	.30	.33	.06	.40
31	1.72	.17	.10		.07	.14	.14		.04	.97	.34	1.7	
32	3.56		.13		.18	.27	.27		.10	1.26	.83	.21	.63
33	1.13		.07		.06	.06	.06	.02		.02			
34	.51		.19	.18	.51	.43	.43		.07	.17	.60	.23	
35	.67		.04		.09	.16	.16	.02	.06	.97	.14	16	.21
37	.43				.04	.11	.11			.61		.32	
38	2.23		.05		.26	.02	.14	.02		.30	.05	.18	.28
39	1.31				.06		.56		.04				1.31
40	1.17		.04		.49	.03	.68			.43	.17	.73	
41	.04	.43	.05	.02	.17	.05	.06	.04	.05	1.22	.14	.35	
42	.79				.32	.02	.08	.02	.05		.32	.16	.10
43	.62	.04	.10	.07	.01	.01	.12	.02	.01	.70	.17	.21	.16
44	1.09	.59			.31	.05	.07	.01			.15	18	.10
45	1.88				.30	.03	.24		.03	.65	.12	.05	.13
46	1.02	1.42		.10		.07	.21	.04	.18	.04	.55	.22	.24
47	2.42	.12			.33		.21		.06		.37	.03	.11
48	.31	.51	.06		10	.03	.33	.01		.68	.08	.05	.06
49	.28		.05		.12	.04	.02	.01		.06	.19	.19	.10
51	.56		.02		.27	.02	.06	.01	.04		.03	.23	.23
53	.96										.41		
54	2.21			.24	.42	.19	.24	.03	.19	.64	.24	1.17	.19
55	.55									1.92	.27	.27	.22
56	1.45				.15		.08		.06	.24	.16	.05	.10
57	2.24				.11	.11	.14	.07			.45	.22	.22
58	1.06	.22			.03		.03		.05			.03	.40

TABLE 89

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

Number of City	Total	Teaching	Supervision	Clerk	Janitors	Truant Officers	Text-books	Supplies	Janitors' Supplies	Board of Education and Supervisors' Supplies	Fuel	Light and Power	Water
1	35.64	22.30	1.03	.18	2.35	.14	1.83	1.18	.31	.04	1.63	.17	
2	28.00	17.60	.93	.07		.16	1.24	.31	.14		4.70	.13	.07
3	28.06	19.10	1.12		1.98			1.72	.28		1.32		
4	31.90	20.35	3.44	.11	2.27	.08	1.08	.92	.22		1.53	.07	.12
5	33.27	24.41	.74	.18	2.19	.26		1.99	.06	.08	2.03	.16	
6	27.65	20.10	1.15		1.45			1.81	.05	.03	1.14	.07	
7	21.61	12.91	1.71	.11	2.05	.18	.54	.81	.18		.80		
8	31.16	18.10	4.23		1.89	.39	1.55	.46	.05	.10	1.82	.05	.10
9	31.01	20.63	.86	.33	2.32	.15		2.08			2.91		.17
10	43.23	31.91	.73	.29	2.56	.20	.99	1.39	.12	.18	1.84	.11	.23
11	29.01	14.42	3.35	.32	2.65	.32			1.94		1.77	.18	
12	29.20	18.75	2.60		2.21	.07	.85		1.09		2.05		
13	29.56	15.90	5.14	.19	2.03	.28	.77	.83	.07		1.95	.05	.16
14	28.75	17.89	1.44		1.95	.07	.89	.71	.08		2.50		
15	25.35	17.91	.55	.12	1.53	.04	1.01	1.01	.07		1.71	.07	
16	28.41	19.17	2.22		1.82	.39	.82	.94			1.44		.33
17	36.00	22.60	2.82	.22	2.53	.14	1.05	1.11		.01	2.64	.29	
18	35.70	25.17	1.60		2.43	.08			2.71		2.30		
19	28.90	18.16	.98	.19	1.97	.04	1.37	.82			2.08		.11
20	23.16	16.58	.49		1.19	.15	.55	.36	.04		2.29	.03	.21
21	24.50	16.90	3.08	.05	1.44	.05		.38	.09	.05	.94	.05	.04
22	8.94	6.63	.11		.37			.53	.13	.02	.37	.03	
23	12.85	3.69	3.78	.08	1.92	.08					1.27		.08
24	15.26	9.87	1.41	.23	.96		.10	.22	.01	.01	1.03	.07	.14
25	31.00	21.67	2.45		1.53		.11	.11	.03	.05	2.04	.04	.25
26	32.67	18.37	5.47	.19	1.92	.03	.66	.99	.04	.03	1.45	.05	.18
27	26.96	15.11	2.82		1.95		1.64		.48		1.25		.12
28	30.30	19.77	1.19	.39	2.19	.20		1.14			2.28		1.38
29	29.50	18.21	.86		2.06	.09		2.01	.33		1.51	.01	.08

TABLE 89 (*Continued*)

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

Number of City	Repairs	Rent	School Census	Transportation of Pupils	Insurance	Freight and Expressage	Printing and Advertising	Telegraph, Postage, etc.	Telephones	Miscellaneous Expenses	Furniture (not put in new buildings)	Apparatus	Reference and Library Books
1	1.88	.01	.25	.73		.16	.11	.02	.10	.16	.56	.47	.02
2	1.50	.05	.05	.83					.01		.14	.07	
3	1.09									1.28	.15		
4	1.06	.05	.02			.05	.04	.01	.09		.11	.27	
5	.33		.11	.34					.01		.11	.16	.08
6	1.09			.41		.05	.04	.01	.01			.19	
7	1.43		.02	.45	.19	.03	.11	.01			.06		
8	1.17		.05	.56	.19	.04	.08	.03	.03		.13	.08	.05
9	.05		.05						.03	1.42			
10	2.29		.05	.19			.10		.01				
11	1.24	.14		.26	.26	.04	.04	.01	.05	1.96	.07		
12	1.03	.07	.04	.28		.04			.06				
13	.77	.04	.03	.14	.48	.05	.05	.01		.37	.14	.06	.01
14	2.02	.03	.03	.46		.10	.05			.17	.21	.10	.05
15	.69	.17	.03	.22		.03	.06	.01	.01		.02	.07	.01
16	1.14		.05	.10									
17	1.43		.03	.36		.07	.12	.01	.02	.08	.12	.25	.07
18	.98		.05	.25		.04	.08	.02	.02				
19	1.64		.07	.82		.05	.05	.01	.01		.16	.35	
20	.85	.09		.07			.05		.01	.22			
21	.94				.14	.02	.01	.01	.01		.19		.07
22	.59	.01	.02			.01	.06						.08
23	.90		.06	.03	.40				.01		.19	.08	.26
24	.45		.03		32		.05	.01	.02	.19			.13
25	1.83		.08		.25	.01	.25	.01	.14			.05	.11
26	1.12	.19	.10	.03	.44	.03	.10	02	.01			.17	1.05
27	.63	.54	.10		.03		.08			1.18	.24	.44	.27
28		.14	.13						.05	.89	.23	.35	
29		3.15	.07	.36		.14	.11					.35	.18

TABLE 89 (*Continued*)

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

Number of City	Total	Teaching	Supervision	Clerk	Janitors	Truant Officers	Text-books	Supplies	Janitors' Supplies	Board of Education and Supervisors' Supplies	Fuel	Light and Power	Water
30	37.32	25.25	1.01	.27	2.36	.34	.64	1.04	.26		1.85	.07	
31	27.90	15.75	.79	.28	1.84	.32	1.56				3.49	.09	
32	34.49	19.07	1.29	.30	1.93	.17	.37	.64	.13	.64	2.25	.25	
33	24.85	16.78	3.18	.35	1.52	.09		.17	.04	.03	1.24	.04	
34	35.96	23.15	1.56	.44	2.92	.56	.02	.33	.22	.09	3.61	.08	
35	24.52	17.87	.49	.17	1.60	.18	.02		.10	.06	1.39	.07	
36	31.94	18.88	5.54	.25	1.11	.10		.21	.07	.02	1.66	.22	.18
37	19.26	11.40	3.25	.39	1.01	.09		.40			1.15		
38	23.56	15.21	1.75		.91	.40	.05	.10	.15	.05	1.30		
39	32.01	19.94	3.55	.31	1.67	.25		.56	.25		2.11		
40	34.79	21.90	1.42	.44	1.38	.29	.60	1.45	.11		3.06		.25
41	24.65	15.99	1.03	.46	1.13	.02	1.40		.04	.01	1.49	.12	.22
42	28.50	15.47	4.43	.32	1.49	.32	1.43	1.12	.16		1.59		.32
43	26.09	17.00	.92	.17	1.73	.21	.49	.45	.18	.03	2.31	.10	.15
44	26.18	16.69	1.19	.16	1.58	.23	.31		.03	.40	2.62	.13	.21
45	28.53	19.14	.64	.05	1.53	.19	1.55	.35	.08	.05	1.08	.26	
46	41.52	25.53	4.71	.31	1.91	.21	1.19	.72	39	.19	1.63	.05	.14
47	20.71	5.78	3.37	.75	1.75	.18	.69		.57		3.34	.12	.04
48	22 75	13.29	2.23	.25	1.36	.30	.97	.31	.05	.04	1.39	.05	.12
49	22.20	14.20	2.69	.15	.89	.30	1.15	.22	.15	.08	1.22		.04
51	32.05	21.05	4.45	.32	1.76	.21	.59	.15	.15	.02	1.79	.04	
52	26.39	13.81	1.75	.19	1.84	.16	.79	.92	.16	.12		1.19	
53	30.61	20.49	3.74	.21	2.11			1.49		.29		.85	
54	54.72	30.60	5.87	.69	3.05		2.11	2.50	.43	.18	2.72	.58	
55	20.50	12.61	.69	.11	1.09	.23	1.14				1.14	.11	
56	28.01	15.33	4.56	.22	2.35	.08	.45	.52	.33	.47	1.22	.11	
57	51.25	33.20	5.09	.96	2.42		1.34	2.23	.11	.11	2.01	.22	
58	21.51	13.55	2.08	.14	1.17		1.39		.28	.14	.69	.06	.10

TABLE 89 (*Continued*)

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

Number of City	Repairs	Rent	School Census	Transportation of Pupils	Insurance	Freight and Expressage	Printing and Advertising	Telegraph, Postage, etc.	Telephones	Miscellaneous Expenses	Furniture (not put in new buildings)	Apparatus	Reference and Library Books
30	2.75		.02			.31	.22		.12		.34	.07	.42
31	1.79	.10	.11		.08		.15		.04	1.01	.35	.18	
32	3.67		.13		.18	.06	.27		.10	1.29	.86	.21	.65
33	1.17		.07		.06	.01	.06	.03		.02			
34	.52		.19	.18	.52		.44		.07	.17	.61	.23	
35	.68		.04		.09	.02	.16	.02	.06	.99	.14	.16	.21
36	.72		.10		.33	.06	.02	.02	.08	1.57	.41	.19	.27
37	.45				.04		.11			.63		.33	
38	2.32		.05		.27	.02	.14	.02		.31	.05	.18	.29
39	1.36				.06		.59		.04				1.36
40	1.21		.05		.51	.03	.70			.45	.18	.76	
41	.04	.45	.06	.03	.17	.05	.06	.04	.05	1.27	.15	.36	
42	.80				.32	.02	.08	.02	.05		.32	.16	.10
43	.65	.04	.11	.07	.01	.01	.13	.02	.01	.69	.17	.22	.17
44	1.12	.60			.32	.05	.07	.01			.15	.18	.10
45	1.98				.32	.04	.25		.03	.68	.13	.05	.14
46	1.07	1.49		.11		.08	.22	.04	.19	.04	.58	.23	.25
47	2.03	.14			.37		.23		.07		.42	.04	.13
48	.34	.56	.06		.11	.04	.36	.01		.73	.08	.05	.06
49	.29		.05		.13	.04	.03	.01		.06	.20	.20	.11
51	.59		.02		.29	.02	.06	.01	.05		.03	.25	.25
52	3.95				.31	.18	.21		.03	.47		.26	.05
53	1.00										.42		
54	2.30			.25	.43	.20	.25	.04	.20	.66	.25	1.21	.20
55	.57									2.01	.29	.29	.23
56	1.50				.16		.08		.07	.25	.17	.06	.11
57	2.23				.11	.11	.13	.07			.45	.22	.22
58	1.12	.24			.03		.03		.06			.03	.42

TABLE 90

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Thirty of the cities which reported in 1902–03 reporting for the year 1903–04.

Number of City	Total	Teaching and Supervision	Teaching	Supervision	Janitors' Salaries	Text-books and Supplies	Fuel	Repairs
5	34.08	25.51	24.77	.74	2.31	1.29	2.75	.33
6	24.26	15.80	14.66	1.14	1.61	1.63	1.91	2.18
8	32.36	23.65	22.58	1.07	1.86	1.83	1.78	1.12
13	34.21	25.52	20.91	4.61	1.94	1.82	2.25	.82
14	28.79	19.96	18.58	1.38	2.28	1.63		1.36
15	24.65	18.71	14.88	3.83	1.57	1.36	1.44	.69
16	28.18	21.32	19.23	2.09	1.90	1.51	1.99	.82
20	23.06	17.40	16.71	.69	1.26	1.21	1.94	.55
27	26.25	18.23	14.57	3.67	2.07	1.62	.58	.97
28	29.38	20.63	19.50	1.13	2.08	.87	3.94	
29	24.72	15.54	15.78	.76	2.08	1.97	1.49	1.26
30	38.70	26.99	26.00	.99	2.42		1.67	3.57
31	30.92	21.17	20.37	.80	2.04		3.12	2.82
32	28.00	20.11	15.52	4.59	2.04	.78	1.69	1.02
34	31.54	21.62	20.23	1.39	3.37		1.13	1.61
35	29.93	23.40	21.75	1.65	1.43	.14	1.90	1.47
36	31.70	26.49	21.20	5.29	1.16		2.04	.04
37	20.71	15.76	12.15	3.61	1.08		1.63	.94
39	28.78	21.46	17.80	3.66	1.59			1.15
40	31.14	21.35	15.72	5.63	1.14	2.03		1.17
41	25.34	17.94	14.37	3.57	1.15	1.40	1.86	.91
42	29.09	20.32	15.72	4.60	1.50	2.68	1.38	.98
43	30.49	22.94	22.01	.93	1.92	.92	.94	.89
45	29.07	21.22	19.38	1.84	1.67	1.61	1.18	1.47
48	27.72	19.66	15.67	3.99	1.51	1.97	1.41	1.07
52	29.02	19.08	17.45	1.63	2.30	2.11	1.09	1.37
54	48.22	30.98	25.20	5.78	2.56	8.70		1.36
55	17.91	13.19	12.07	1.12	1.06	1.09	.84	.22
56	30.93	22.22	20.85	1.37	2.58	1.30	1.36	1.12
57	52.48	39.10	34.07	5.03	2.94	3.22	2.07	2.18

TABLE 91

The average cost per pupil for two school years, 1902–03 and 1903–04. This table is derived from Tables 89 and 90 which are based on the average number of pupils in daily attendance. Thirty cities.

Number of City	Total	Teaching and Supervision	Teaching	Supervision	Janitors' Salaries	Text-books and Supplies	Fuel	Repairs
5	33.67	25.33	24.59	.74	2.25	1.64	2.39	.33
6	25.95	18.52	17.38	1.14	1.53	1.72	1.52	1.03
8	31.76	22.99	20.34	2.65	1.87	1.92	1.80	1.14
13	31.88	23.28	18.40	4.88	1.98	1.71	2.10	.79
14	28.77	19.64	18.23	1.41	2.11	1.62	2.48	1.69
15	25.00	18.58	16.39	2.19	1.55	1.69	1.57	.69
16	28.39	21.35	19.20	2.15	1.86	1.63	1.71	.98
20	23.11	17.23	16.64	.59	1.22	1.06	2.12	.70
27	26.10	18.08	14.84	3.25	2.01	1.63	.91	.85
28	29.84	20.79	19.63	1.16	2.13	1.00		
29	27.11	17.80	16.99	.81	2.07	1.99	1.50	1.26
30	38.01	26.62	25.62	1.00	2.39		1.76	3.16
31	29.41	18.85	18.06	.79	1.94		3.30	2.30
32	31.24	20.23	17.29	2.94	1.98	.89	1.97	2.34
34	33.75	25.16	21.69	1.47	3.14		2.37	1.06
35	27.22	20.88	19.81	1.07	1.51		1.14	1.07
36	31.82	25.45	20.04	5.41	1.13		1.85	.38
37	19.98	15.20	11.77	3.43	1.04		1.39	.69
39	30.39	22.47	18.87	3.60	1.63		1.99	1.25
40	32.96	22.33	18.81	3.52	1.26	2.03	2.45	1.19
41	24.99	17.48	15.18	2.30	1.14	1.40	1.67	.47
42	28.79	17.09	15.58	4.51	1.49	2.61	1.45	.89
43	28.29	20.42	19.50	.92	1.82	.93	1.62	.77
45	28.80	20.50	19.26	1.24	1.60	1.75	1.13	1.72
48	25.26	17.59	14.48	3.11	1.43	1.62	1.40	.70
52	27.70	17.32	15.63	1.69	2.07	1.91	1.00	2.66
54	51.47	33.72	27.90	5.82	2.86	6.15	2.32	1.83
55	19.20	13.24	12.34	.90	1.07	1.11	.99	.39
56	29.47	21.05	18.09	2.96	2.46	1.13	1.29	1.31
57	51.86	38.69	33.63	5.06	2.68	3.39	2.04	2.20

Table 87 is derived by finding the average for two years. Thus, for city number five, for the first year, teaching and supervision amounted to 75.9 per cent of the total, for the same city for the second year this item was 74.9 per cent of the total; the average of the two, 75.4 per cent, gives the first figure of Table 87. In like manner, janitors' salaries, for the first and second years respectively, for city number five amount to 6.6 and 6.8 per cent. This gives us our figure, 6.7 per cent, for janitors' salaries for city number five in Table 87 (see Table 87, first line, column three).

Table 88 gives the cost per pupil expressed in dollars and cents. The number used as a divisor here is the figure half-way between the average number of pupils in daily attendance and the average daily enrollment, or average number belonging, as it is sometimes expressed. As stated elsewhere in the text, it is my opinion that this is a better figure than either average daily attendance or average daily enrollment. The only reason that this basis is not used throughout the study is because the figures for average daily enrollment could not be secured for a number of the cities. In the section giving coefficients of correlation will be found a number of coefficients which were worked out on this basis from this table. This table gives data for forty-eight cities for the school year 1902–1903. The first line reads as follows: City number one spent $34.18 per pupil for the maintenance and operation of schools, of which $21.38 per pupil was spent for teaching, $0.99 per pupil for supervision, $0.17 per pupil for clerk, $2.26 per pupil for janitors' salaries, etc.

Table 89 gives the cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor in this case. The first line reads as follows: City number one spent $35.64 per pupil for the maintenance and operation of schools, of which $22.30 per pupil was spent for teaching, $1.03 per pupil for supervision, etc. This table gives data for fifty-seven cities for the school year 1902-1903.

Table 90 gives the same information as Table 89, calculated on the same basis for thirty of these cities for the school year 1903–1904. This table is read the same as Table 89.

Table 91 gives the average cost per pupil for thirty cities for two years, the school years 1902–1903 and 1903–1904, for the principal items of expense. This table is derived from Tables 89 and 90, which are based on the average number of pupils in daily attendance. The first line reads as follows: In city number five the average for two years of the cost per pupil for maintenance and operation of schools was $33.67 (1902–1903, $33.27; and 1903–1904, $34.08); for teaching and supervision the average was $25.33; for teaching alone, $24.59, etc.

Throughout the tables a number written across the space between the columns indicates that this number applies to the two adjoining columns taken together, and similarly an underscore running across three or more columns indicates that the number applies to these columns collectively.

Variability

In the tables given above, which compare the different items of the school budget on a common basis, the most striking thing to be noticed is the variability which exists among the cities. It is the purpose of this section to consider somewhat minutely the problem of variability in connection with the apportionment of school moneys among the several items of the budget. It may not be out of place here to call attention to the ambiguity if not the positive misrepresentation of facts which results when, as in most cases where such data have been collected, the average alone is given to represent the facts. Of course, if one accepts the average as meaning simply that the sum of all the cases is divided by their number, no harm is done; but if one takes the average as indicative of the general tendency or as a measure applicable to

the majority of the cases, he may be most completely deluded. The average expenditure per pupil for cities Nos. 22, 23, 54, and 57 for the first year (see Table 89) is $31.94. They spent $8.94, $12.85, $54.72, and $51.25 respectively per pupil. The average in this case does not correctly represent the group nor any particular city within the group. The thing that interests us in the measurement of any trait in a group is the range or limits within which all of the cases lie, and the grouping of the cases within these limits.

If we consider the facts found in the tables already given we find that cities differ greatly not only in the amount per pupil which they spend for the maintenance and operation of their schools, but also that even where cities spend about the same amount per child, the distribution of this money among the several items of the budget is very different. Again, when we consider simply the distribution of the money that is spent, regardless of the amount, as is done in the table which gives the per cent which each item is of the total cost of maintenance and operation, we find that there is the greatest variability in practice. One city spends 44% of the cost for maintenance and operation for teaching and supervision, while another spends 82% for the same purposes; the janitor receives from 3% to 14% of the money used to run the schools; supervision costs one city 1% and another city 17% of the whole amount spent; salaries for teaching vary from 27% to 73% of the budget. It would seem impossible that the money is properly distributed in every case when we consider this remarkable variability in practice.

The undistributed expenditure reported under the head "Miscellaneous" needs to be considered in any argument concerning the variability in any item as reported by several cities. It is possible that a very large part of the amount thus reported properly belongs to some one of the items for which a report has been made. It may be that the item teaching, supervision, fuel,

janitors' salaries, repairs, or some other would be greatly increased if the report had properly distributed the money. It was to guard against any such obscurity that the attempt was made in this study to secure a complete distribution of expenditures in the cities from which information was received, and, as has been noted above, this attempt was to a remarkable degree successful. Thirty cities out of fifty-eight for the first year report nothing under this head; sixteen reported less than 2%, ten others less than 5%, and the two remaining reported 5.14% and 6.75%, respectively, as unclassified expenditures. For the second year, of thirty cities reporting, eighteen report nothing under "Miscellaneous"; and of the remaining twelve, eight report 1% or less; three, 2%; and one, 3.76% under this head. It is quite evident, I believe, that the miscellaneous item is so small, even where it occurs, that it may not be used as an explanation of the variability which occurs in all items of expenditure; and I feel that it is safe to say that the accurate distributions of the amounts reported under this head would not alter the conclusions reached in this paper.

It might be argued that the great variability is due to the fact that the cities for which data are given are not comparable, that one has at its command a much larger amount of money in proportion to the number of children to be educated than another, and hence the variability. It is true that rightly or wrongly some of these cities are much better provided with money than others, but that does not seem to be the cause of the great variability in the apportionment of the money which they do have. Take, for example, cities Nos. 3, 6, 19, 21, 44, and 56. From the information given in Tables 89 and from the data concerning attendance, Table 92 may be built up:

TABLE 92

No. of City	Total Expense	No. of Pupils in Daily Attendance	Cost Per Pupil
3	$52,708	1,876	$28.06
6	50,613	1,826	27.65
19	52,870	1,831	28.90
21	52,178	2,127	24.50
44	48,410	1,850	26.18
56	50,192	1,794	28.01

Per cent spent for each item:

No. of City	Teaching	Supervision	Janitors	Fuel	Text-books and Supplies	Repairs
3	68.2	4.	7.1	4.7	6.1	3.9
6	72.9	4.2	5.3	6.1	6.6	4.
19	62.9	3.4	6.8	7.2	7.5	5.7
21	69.1	12.6	5.9	3.8	1.5	3.8
44	63.8	4.6	6.1	10.	1.2	4.3
56	54.6	16.3	8.4	4.4	3.4	5.3

The variation found cannot be due in these cases to a large undistributed amount, for five of these cities distributed their expenditures in the special reports received from them according to the classification given, without finding it necessary to report anything under the head "Miscellaneous," and the other (No. 56) reports only nine-tenths of 1% under this head.

In these cities the amount of money available and the number of pupils to be provided for do not differ very much. We might expect that if there were any principle which controlled the apportionment of money, or if the money were apportioned in the best way, the proportion of the whole cost of maintenance and operation spent for any of the principal items would be approximately the same in these cities. By glancing at the table, however, we see here the same marked variability which is found when the whole number of cities is considered. Not that there is quite so great a range, which would be very unusual because of the limited number of cases, but that the distribution of money among the several items seems not to be determined by any common principle.

It seems strange that of two cities (No. 6 and No. 56) which spend respectively $50,613 for 1826 pupils and $50,192 for 1794 pupils, one should spend 72.9% of its money for teaching while the other spends 54.6% for the same purpose. Of course, if we combine the items of teaching and supervision, they do not differ so much (77.1% and 70.9%), but if this combination of items is made throughout for the cities of this table, we have a variation in the proportion spent for teaching and supervision of from 66.3% to 81.7% of the total (see Nos. 19 and 21). For the other items in these cities in which the conditions seem to be so much alike, the table shows the same variability. Janitors' salaries vary from 5.3% to 8.4%; fuel, from 3.8% to 10% (in cities which spend respectively $24.50 and $26.18 per pupil); text-books and supplies, from 1.2% to 7.5%; and repairs from 3.8% to 5.7% of the total.

It is, indeed, strange if 44% of the cost of maintenance and operation can in one city provide for proper teaching and supervision, that in another city, which spends more per pupil, it requires 82% of the total for this item. It would seem that owing to tradition, to poor business management, or to some other more invidious cause, the money spent is not always spent to the best advantage. It seems possible, also, that the superintendent whose attention is called to the wide variation in any one item of his budget, might be led to investigate the matter, in order to determine whether there is any good reason for such deviation from the ordinary or normal condition of affairs.

A more careful study of the variability of the several items of the budget shows that in many cases a large expenditure for one item is accompanied by a small expenditure for another. Again, in other cases large expenditures in one item seem to be accompanied by large expenditures in others and small expenditures in some by small expenditures in others. One has but to examine carefully the tables to have suggested the possibility of

significant relationships. In another section I shall consider this matter more fully and measure a number of these relationships exactly by means of the Pearson Coefficient of Correlation.

There are three ways in which we shall express the variability in order to get as clear an idea as is possible of the lack of uniformity and in order to suggest the problems which arise because of this variability.

From the tables already given it is possible for us to make out frequency tables like those which follow. In these tables the first column gives the amount of money spent, or the per cent of the total which the item is, and the second column gives the number of instances where this is true. They give all the facts concerning variability; not only the range or limits within which all of the cases lie, but also the exact placing of every case.

Explanation of Tables

Table 93 gives information for the cities reporting for the school year 1902–1903.

Table A reads as follows: one city spends 27% for teaching; one, 49%; one, 52%; one, 53%; two, 54%, etc.

Table B reads as follows; two cities spend 1% for supervision; eleven spend, 2%; seven, 3%, etc.

Reading the first lines of Tables C and D we find that four cities spent 3% of the budget for janitors' salaries, and that six cities spent 3% for fuel.

TABLE 93

TABLES OF FREQUENCY

The per cent of the total expenditure for maintenance and operation which is spent for teaching, supervision, janitors' salaries, and fuel. Fifty-eight cities, reporting for the school year 1902–03.

A Teaching		B Supervision		C Janitors' Salaries		D Fuel	
Per Cent	Frequency	Per Cent	Frequency	Per Cent	Frequency	Per Cent	Frequency
27	1	1	2	3	4	3	6
28	1	2	11	4	6	4	12
29	0	3	7	5	15	5	10
30	0	4	6	6	19	6	11
31	0	5	1	7	7	7	4
32	0	6	2	8	3	8	3
33	0	7	5	9	2	9	3
34	0	8	0	10	0	10	2
35	0	9	5	11	0	11	0
36	0	10	3	12	0	12	1
37	0	11	4	13	0	13	0
38	0	12	3	14	1	14	0
39	0	13	2			15	0
40	0	14	0			16	2
41	0	15	1				
42	0	16	4				
43	0	17	2				
44	0						
45	0						
46	0						
47	0						
48	0						
49	1						
50	0						
51	0						
52	1						
53	1						
54	2						
55	2						
56	3						
57	0						
58	3						
59	2						
60	0						
61	3						
62	6						
63	6						
64	6						
65	3						
66	2						
67	3						
68	2						
69	2						
70	1						
71	2						
72	1						
73	4						

TABLE 94

TABLES OF FREQUENCY

The per cent of the total expenditure for maintenance and operation which is spent for teaching, supervision, janitors' salaries, and fuel. Average for two years, thirty cities reporting for the school years 1902–03 and 1903–04.

Teaching		Supervision		Janitors' Salaries		Fuel	
Per Cent	Frequency	Per Cent	Frequency	Per Cent	Frequency	Per Cent	Frequency
54	3	2	4	3	2	3	4
55	2	3	4	4	1	4	3
56	1	4	5	5	10	5	8
57	2	5	0	6	11	6	9
58	0	6	1	7	4	7	2
59	2	7	1	8	1	8	2
60	2	8	2	9	1	9	0
61	1	9	2			10	0
62	3	10	2			11	1
63	1	11	3				
64	4	12	2				
65	2	13	0				
66	2	14	0				
67	2	15	2				
68	1	16	0				
69	0	17	2				
70	0						
71	0						
72	2						
73	1						

It is interesting to compare the distributions given above with similar figures in Table 95 for one hundred and three cities considered in "A Study of the Expenses of City School Systems" by Dr. Harlan Updegraff [1912], recently issued by the United States Bureau of Education.

TABLE 95

DISTRIBUTION OF PERCENTAGES OF TOTAL SCHOOL EXPENSES EXPENDED FOR VARIOUS PURPOSES

A. FOR SUPERINTENDENT'S OFFICE

Per Cent of Total School Expenses	Number of Cities	Per Cent of Total School Expenses	Number of Cities
Less than 0.50	2	2.50 to 2.99	13
0.50 to 0.99	14	3.00 to 3.49	9
1.00 to 1.49	15	3.50 to 3.99	4
1.50 to 1.99	25	4.00 to 4.50	3
2.00 to 2.49	17		

TABLE 95 (*Continued*)

DISTRIBUTION OF PERCENTAGES OF TOTAL SCHOOL EXPENSES EXPENDED FOR VARIOUS PURPOSES

B. GENERAL CONTROL

Less than 1.00	1	5.00 to 5.99	7
1.00 to 1.99	13	6.00 to 6.99	5
2.00 to 2.99	32	7.00 to 7.99	1
3.00 to 3.99	24	8.00 to 8.99	3
4.00 to 4.99	16	9.00 to 9.99	1

C. SALARIES OF ELEMENTARY TEACHERS

Below 42.50	1	55.00 to 57.49	9
42.50 to 44.99	2	57.50 to 59.99	18
45.00 to 47.49	9	60.00 to 62.49	9
47.50 to 49.99	9	62.50 to 64.99	5
50.00 to 52.49	16	65.00 to 67.49	3
52.50 to 54.99	20	Above 67.50	2

D. TOTAL EXPENSES OF ELEMENTARY SCHOOLS

Below 65.00	3	75.00 to 77.49	24
65.00 to 67.49	0	77.50 to 79.99	22
67.50 to 69.99	9	80.00 to 82.49	10
70.00 to 72.49	11	82.50 to 84.99	4
72.50 to 74.99	16	85.00 to 87.49	4

E. SALARIES OF SECONDARY TEACHERS

Per Cent of Total School Expenses	Number of Cities	Per Cent of Total School Expenses	Number of Cities
Below 6.00	2	12.00 to 13.99	20
6.00 to 7.99	7	14.00 to 15.99	17
8.00 to 9.99	18	16.00 to 17.99	9
10.00 to 11.99	26	18.00	3

F. TOTAL EXPENSES OF SECONDARY SCHOOLS

7.50 to 9.99	8	17.50 to 19.99	21
10.00 to 12.49	14	20.00 to 22.49	8
12.50 to 14.99	22	22.50 to 24.99	7
15.00 to 17.49	21	25.00 to 27.50	2

TABLE 95 (*Continued*)

DISTRIBUTION OF PERCENTAGES OF TOTAL SCHOOL EXPENSES EXPENDED FOR VARIOUS PURPOSES

G. SALARIES OF TEACHERS OF ALL SCHOOLS

52.5 to 54.9	1	67.5 to 69.9	22
55.0 to 57.4	4	70.0 to 72.4	17
57.5 to 59.9	1	72.5 to 74.9	11
60.0 to 62.4	10	75.0 to 77.4	2
62.5 to 64.9	14	77.5 to 80.0	2
65.0 to 67.4	17	Above 80.0	2

H. SUPERVISION OF ALL SCHOOLS

Less than 1.00	15	6.00 to 6.99	2
1.00 to 1.99	24	7.00 to 7.99	2
2.00 to 2.99	18	8.00 to 8.99	2
3.00 to 3.99	5	9.00 to 9.99	3
4.00 to 4.99	5	10.00 and over	5
5.00 to 5.99	4		

I. TEXT-BOOKS, STATIONERY, AND SCHOOL SUPPLIES OF ALL SCHOOLS

Less than 1.00	9	5.00 to 5.99	14
1.00 to 1.99	17	6.00 to 6.99	8
2.00 to 2.99	17	7.00 to 7.99	5
3.00 to 3.99	17	8.00 to 8.99	1
4.00 to 4.99	12	9.00 to 9.99	1

J. FUEL FOR ALL SCHOOLS

Less than 1.00	5	5.00 to 5.99	13
1.00 to 1.99	12	6.00 to 6.99	1
2.00 to 2.99	22	7.00 to 7.99	3
3.00 to 3.99	26	8.00 to 8.99	1
4.00 to 4.99	18		

K. INSTRUCTION, OPERATION, AND MAINTENANCE OF ALL SCHOOLS

Below 84.00	1	92.00 to 93.99	28
84.00 to 85.99	2	94.00 to 95.99	46
86.00 to 87.99	1	96.00 to 97.99	14
88.00 to 89.99	3	98.00 to 100.00	1
90.00 to 91.99	7		

TABLE 96

TABLES OF FREQUENCY

Cost per pupil expressed in dollars, the average daily attendance being used as the basis of calculation. Fifty-eight cities, reporting for the school year 1902–03.

Total Cost per Pupil		Teaching and Supervision		Janitors' Salaries		Fuel		Text-books and Supplies	
Dollars	Frequency	Dollars	Frequency	Dollars	Frequency	Dollars	Frequency	Dollars	Frequency
8	1	6	1	.4	1	.4	1	.2	2
9	0	7	1	.5	0	.5	0	.3	1
10	0	8	0	.6	0	.6	0	.4	1
11	0	9	1	.7	0	.7	1	.5	0
12	1	10	0	.8	0	.8	1	.6	0
13	0	11	1	.9	2	.9	1	.7	1
14	0	12	0	1.0	3	1.0	2	.8	0
15	1	13	1	1.1	4	1.1	3	.9	2
16	0	14	2	1.2	0	1.2	5	1.0	2
17	0	15	3	1.3	2	1.3	4	1.1	2
18	0	16	3	1.4	3	1.4	3	1.2	1
19	1	17	6	1.5	5	1.5	2	1.3	3
20	2	18	3	1.6	2	1.6	3	1.4	1
21	2	19	8	1.7	3	1.7	3	1.5	2
22	2	20	3	1 8	4	1.8	3	1.6	4
23	2	21	5	1.9	8	1.9	1	1.7	3
24	4	22	1	2.0	3	2.0	5	1.8	1
25	1	23	5	2.1	3	2.1	0	1.9	3
26	4	24	4	2.2	2	2.2	3	2.0	5
27	2	25	3	2.3	4	2.3	2	2.1	2
28	8	26	2	2.4	2	2.4	0	2.2	0
29	4	27	0	2.5	2	2.5	0	2.3	1
30	2	28	0	2.6	1	2.6	2	2.4	0
31	5	29	0	2.7	0	2.7	1	2.5	1
32	3	30	1	2.8	0	2.8	0	2.6	0
33	1	31	0	2.9	1	2.9	1	2.7	0
34	2	32	1	3.0	1	3.0	0	2.8	0
35	3	33	0			3.1	0	2.9	0
36	1	34	0			3.2	0	3.0	1
37	1	35	0			3.3	1	3.1	0
38	0	36	1			3.4	1	3.2	0
39	0	37	0			3.5	0	3.3	0
40	0	38	1			3.6	1	3.4	0
41	1					3.7	0	3.5	1
42	0					3.8	0	3.6	0
43	1					3.9	0	3.7	0
44	0					4.0	0	3.8	0
45	0					4.1	0	3.9	0
46	0					4.2	0	4.0	0
47	0					4.3	0	4.1	0
48	0					4.4	0	4.2	0
49	0					4.5	0	4.3	0
50	0					4.6	0	4.4	0
51	1					4.7	1	4.5	0
52	0							4.6	1
53	0								
54	1								

TABLE 97

TABLES OF FREQUENCY

Cost per pupil expressed in dollars, average for two years, the average daily attendance being used as the basis of calculation. Thirty cities, reporting for the school years 1902–03 and 1903–04.

Total Cost per Pupil		Teaching and Supervision		Janitors' Salaries		Fuel		Text-books and Supplies	
Dollars	Frequency	Dollars	Frequency	Dollars	Frequency	Dollars	Frequency	Dollars	Frequency
19	2								
20	0	13	1	1.0	2	.9	2	.8	1
21	0	14	0	1.1	2	1.0	1	.9	1
22	0	15	1	1.2	2	1.1	1	1.0	2
23	1	16	0	1.3	0	1.2	1	1.1	2
24	1	17	6	1.4	2	1.3	1	1.2	0
25	3	18	4	1.5	3	1.4	2	1.3	0
26	1	19	1	1.6	2	1.5	3	1.4	1
27	3	20	5	1.7	0	1.6	3	1.5	0
28	5	21	2	1.8	3	1.7	2	1.6	6
29	3	22	3	1.9	3	1.8	2	1.7	3
30	1	23	1	2.0	3	1.9	2	1.8	0
31	4	24	0	2.1	2	2 0	1	1.9	3
32	1	25	3	2.2	1	2.1	2	2.0	1
33	2	26	1	2.3	1	2.2	0	2.1	0
34	0	27	0	2.4	1	2.3	3	2.2	0
35	0	28	0	2.5	0	2.4	2	2.3	0
36	0	29	0	2.6	1	2.5	0	2.4	0
37	0	30	0	2.7	0	2.6	0	2.5	0
38	1	31	0	2.8	1	2.7	0	2.6	1
39	0	32	0	2.9	0	2.8	0	2.7	0
40	0	33	1	3.0	0	2.9	0	2.8	0
41	0	34	0	3.1	1	3.0	0	2.9	0
42	0	35	0			3.1	0	3.0	0
43	0	36	0			3.2	0	3.1	0
44	0	37	0			3.3	1	3.2	0
45	0	38	1					3.3	1
46	0							3.4	0
47	0							3.5	0
48	0							3.6	0
49	0							3.7	0
50	0							3.8	0
51	2							3.9	0
								4.0	0
								4.1	0
								4.2	0
								4.3	0
								4.4	0
								4.5	0
								4.6	0
								4.7	0
								4.8	0
								4.9	0
								5.0	0

TABLE 97 (*Continued*)

TABLES OF FREQUENCY

Cost per pupil expressed in dollars, average for two years, the average daily attendance being used as the basis of calculation. Thirty cities, reporting for the school years 1902–03 and 1903–04.

Total Cost per Pupil		Teaching and Supervision		Janitors' Salaries		Fuel		Text-books and Supplies	
Dollars	Frequency	Dollars	Frequency	Dollars	Frequency	Dollars	Frequency	Dollars	Frequency
								5.1	0
								5.2	0
								5.3	0
								5.4	0
								5.5	0
								5.6	0
								5.7	0
								5.8	0
								5.9	0
								6.0	0
								6.1	1

It is interesting to compare with the distribution given above, the facts of Table 98 taken from Dr. Updegraff's study of city school expenses.

The 103 cities of 30,000 population or over whose expenses presented are divided into four groups. Group I is composed of cities of 300,000 population or over in 1910; Group II, of cities of 100,000 to 300,000; Group III, of cities of 50,000 to 100,000; and Group IV, of cities of 30,000 to 50,000. The number of cities in each of the respective groups is as follows; 13, 20, 42, 28. The total number of cities in the United States in 1910 above 30,000 in population was 184, distributed among the various groups as follows: 18, 32, 59, 75.

TABLE 98

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

A. SALARIES OF TEACHERS

AVERAGE COSTS	CITIES OF—				
	Group I	Group II	Group III	Group IV	All Cities
$8–$8.99				1	1
$9–$9.99					
$10–$10.99		1	1	2	4
$11–$11.99			1		1
$12–$12.99		1	2	3	6
$13–$13.99	1		4	2	7
$14–$14.99	1	1	5	3	10
$15–$15.99		1	2	1	4
$16–$16.99		2	4	1	7
$17–$17.99		2	1	2	5
$18–$18.99	1	3	1	1	6
$19–$19.99		2	2	1	5
$20–$20.99	4	1	1		6
$21–$21.99	2		2		4
$22–$22.99			1		1
$23–$23.99					
$24–$24.99		1			1
$25–$25.99					
$26–$27	1				1

B. SUPERVISION

Below $0.20	2	3	2	1	8
$0.20–$0.39	2	3	7	7	19
$0.40–$0.59	2	1	2	1	6
$0.60–$0.79		1	3	2	6
$0.80–$0.99					
$1–$1.19	1		2	1	4
$1.20–$1.39					
$1.40–$1.59		1		1	2
$1.60–$1.79					
$1.80–$1.99	1			1	2
$2–$2.19			1		1
$2.20–$2.39			1		1
$2.40–$2.59			1		1
$2.60–$2.79		1			1
$2.80–$2.99					
$3–$3.20			1		1

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

C. TEXT-BOOKS, STATIONERY, AND GENERAL SUPPLIES

Below $0.20	1	2	1	3	7
$0.20–$0.39	1	1	1	1	4
$0.40–$0.59	1	3	5	3	12
$0.60–$0.79	.....	4	3	1	8
$0.80–$0.99	4	2	2	2	10
$1–$1.19	1	.....	7	2	10
$1.20–$1.39	.....	1	1	2	4
$1.40–$1.59	1	.....	2	2	5
$1.60–$1.79	.....	1	2	1	4
$1.80–$1.99	1	1	1	.....	3
$2–$2.20	.....	.....	1	.....	1

D. SALARIES OF JANITORS, ENGINEERS, AND FIREMEN

$0.40–$0.59	.....	.....	1	.....	1
$0.60–$0.79	.....	.....	.....	.....	.....
$0.80–$0.99	.....	2	2	3	7
$1–$1.19	.....	.....	4	1	5
$1.20–$1.39	3	2	2	1	8
$1.40–$1.59	1	2	5	1	9
$1.60–$1.79	2	2	4	2	10
$1.80–$1.99	1	1	4	3	9
$2–$2.19	.....	3	2	6	11
$2.20–$2.39	1	1	2	.....	4
$2.40–$2.59	1	.....	.....	.....	1
$2.60–$2.79	.....	.....	1	.....	1
$2.80–$2.99	.....	.....	.....	.....	.....
$3–$3.19	.....	2	.....	.....	2
$3.20–$3.40	1	.....	.....	.....	1

E. FUEL

AVERAGE COSTS	CITIES OF—				
	Group I	Group II	Group III	Group IV	All Cities
Below $0.20	.....	.....	.....	1	1
$0.20–$0.39	2	4	3	1	10
$0.40–$0.59	1	2	4	3	10
$0.60–$0.79	4	1	6	2	13
$0.80–$0.99	2	1	8	3	14
$1–$1.19	.....	2	3	1	6
$1.20–$1.39	1	3	.....	2	6
$1.40–$1.59	.....	2	1	2	5
$1.60–$1.80	.....	.....	2	1	3

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

F. REPAIRS OF BUILDINGS

$0.20–$0.39	.....	.....	1	2	3
$0.40–$0.59	.....	2	2	2	6
$0.60–$0.79	1	1	5	1	8
$0.80–$0.99	1	1	2	.....	4
$1–$1.19	1	2	3	.....	6
$1.20–$1.39	1	2	3	2	8
$1.40–$1.59	2	.....	1	3	6
$1.60–$1.79	1	.....	1	3	5
$1.80–$1.99	.....	4	1	1	6
$2–$2.19	.....	.....	1	1	2
$2.20–$2.39	.....	.....	1	.....	1
$2.40–$2.59	1	.....	1	.....	2
$2.60–$2.79	.....	.....	1	.....	1
$2.80–$2.99	.....	.....	.....	.....	.....
$3–$3.19	.....	3	1	.....	4
$3.20–$3.39	.....	.....	.....	.....	.....
$3.40–$3.60	1	.....	.....	.....	1

G. TOTAL EXPENSE OF INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

$11–$11.99	.....	.....	.....	1	1
$12–$12.99	.....	.....	.....	.....	.....
$13–$13.99	.....	1	1	.....	2
$14–$14.99	.....	.....	.....	1	1
$15–$15.99	.....	1	1	.....	2
$16–$16.99	.....	.....	1	2	3
$17–$17.99	.....	.....	.....	.....	.....
$18–$18.99	1	1	3	3	8
$19–$19.99	.....	.....	2	1	3
$20–$20.99	.....	.....	2	.....	2
$21–$21.99	.....	1	5	1	7
$22–$22.99	1	1	4	3	9
$23–$23.99	1	3	.....	1	5
$24–$24.99	.....	1	.....	1	2
$25–$25.99	1	2	2	2	7
$26–$26.99	2	1	3	1	7
$27–$27.99	1	.....	.....	.....	1
$28–$28.99	1	1	.....	.....	2
$29–$29.99	.....	1	2	.....	3
$30–$30.99	.....	.....	1	.....	1
$31–$31.99	1	1	.....	.....	2
$32–$32.99	.....	.....	.....	.....	.....
$33–$34	1	.....	.....	.....	1

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF SECONDARY SCHOOLS

A. SALARIES OF TEACHERS

AVERAGE COSTS	CITIES OF—				
	Group I	Group II	Group III	Group IV	All Cities
$20–$22.49	.....	1	2	2	5
$22.50–$24.99	.....	2	1	2	5
$25–$27.49	.....	.....	.....	1	1
$27.50–$29.99	.....	.....	2	5	7
$30–$32.49	1	1	.....	2	4
$32.50–$34.99	.....	2	6	2	10
$35–$37.49	1	3	5	.....	9
$37.50–$39.99	.....	1	5	.....	6
$40–$42.49	.....	1	.....	1	2
$42.50–$44.99	1	1	1	.....	3
$45–$47.49	.....	2	3	.....	5
$47.50–$49.99	2	.....	.....	.....	2
$50–$52.49	.....	.....	.....	1	1
$52.50–$54.99	2	.....	.....	1	3
$55–$57.49	1	.....	.....	.....	1
$57.50–$59.99	.....	.....	.....	.....	.....
$60–$62.49	.....	1	.....	.....	1
$62.50–$64.99	1	.....	.....	.....	1
$65–$67.49	1	.....	1	.....	2
$67.50–$70.00	.....	.....	1	.....	1

B. TEXT-BOOKS, STATIONERY, AND GENERAL SCHOOL SUPPLIES

$0.49	1	5	1	3	10
$0.50–$0.99	1	.....	3	2	6
$1–$1.49	1	.....	2	.....	3
$1.50–$1.99	.....	1	2	3	6
$2–$2.49	1	2	1	3	7
$2.50–$2.99	2	2	2	1	7
$3–$3.49	1	1	.....	.....	2
$3.50–$3.99	1	1	4	2	8
$4–$4.49	.....	1	3	.....	4
$4.50–$4.99	.....	.....	1	.....	1
$5–$5.49	.....	1	1	.....	2
$5.50–$5.99	1	.....	1	2	4
$6 and over	1	.....	3	.....	4

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF SECONDARY SCHOOLS

C. SALARIES OF JANITORS, ENGINEERS, AND FIREMEN

$1–$1.24	.....	1	2	.....	3
$1.25–$1.49	.....	1	.....	3	4
$1.50–$1.74	.....	.....	2	1	3
$1.75–$1.99	.....	2	2	1	5
$2–$2.24	.....	.....	2	3	5
$2.25–$2.49	1	2	2	1	6
$2.50–$2.74	2	1	2	1	6
$2.75–$2.99	2	1	4	.....	7
$3–$3.24	.....	2	2	2	6
$3.25–$3.49	.....	.....	1	.....	1
$3.50–$3.74	.....	1	1	.....	2
$3.75–$3.99	1	1	1	.....	3
$4–$4.24	1	1	2	2	6
$4.25–$4.49	.....	.....	1	2	3
$4.50–$4.74	.....	.....	.....	.....	.....
$4.75–$4.99	1	.....	.....	.....	1
$5–$5.24	.....	.....	1	.....	1
$5.25–$5.49	1	1	.....	.....	2
$5.50–$5.74	.....	1	.....	.....	1
$5.75–$5.99	.....	.....	.....	.....	.....
$6 and over	1	.....	2	1	4

D. FUEL

AVERAGE COSTS	CITIES OF—				
	Group I	Group II	Group III	Group IV	All cities
Below $0.20	.....	1	.....	.....	1
$0.20–$0.39	1	1	1	.....	3
$0.40–$0.59	.....	1	3	2	6
$0.60–$0.79	1	1	2	.....	4
$0.80–$0.99	2	1	2	1	6
$1–$1.19	1	2	2	2	7
$1.20–$1.39	.....	2	6	1	9
$1.40–$1.59	2	1	3	2	8
$1.60–$1.79	2	.....	2	2	6
$1.80–$1.99	.....	1	3	1	5
$2–$2.19	.....	1	1	1	3
$2.20–$2.39	1	1	1	1	4
$2.40–$2.59	.....	.....	1	1	2
$2.60–$2.79	.....	.....	.....	.....	.....
$2.80–$2.99	.....	.....	.....	.....	.....
$3 and over	.....	1	.....	2	3

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF SECONDARY SCHOOLS

E. REPAIRS TO BUILDINGS

$0.25–$0.49			2	1	3
$0.50–$0.74		1	3	1	5
$0.75–$0.99		1	1	1	3
$1–$1.24	1	1	2	3	7
$1.25–$1.49		1	4		5
$1.50–$1.74		2		2	4
$1.75–$1.99		2			2
$2–$2.24	1	1	3	1	6
$2.25–$2.49	1	1	1	2	5
$2.50–$2.74	1	2	1	1	5
$2.75–$2.99	1				1
$3–$3.24	1				1
$3.25–$3.49	1				1
$3.50–$3.74	1		1		2
$3.75–$3.99					
$4–$4.24			1		1
$4.25–$4.49					
$4.50–$4.74	1				1
$4.75–$4.99		1	1		2
$5 and over			3	1	4

F. TOTAL EXPENSE OF INSTRUCTION, OPERATION, AND MAINTENANCE

$25–$29.99		2	2	3	7
$30–$34.99		1			1
$35–$39.99		1	1	6	8
$40–$44.99		2	7	3	12
$45–$49.99	2	2	5	2	11
$50–$54.99		3	4		7
$55–$59.99	2	1	2	1	6
$60–$64.99	2	1	2		5
$65–$69.99	1	1	1	2	5
$70–$79.99	1	1			2
$80–$89.99	2		1		3
$90–$100			2		2

Dr. Updegraff states the following conclusions based on comparisons of the average costs of the same kinds of expenses in the different groups of cities:

1. The larger the city the greater the average cost per pupil enrolled of—

(*a*) Total cost of instruction, operation, and maintenance of elementary schools.

(*b*) Salaries of elementary-school teachers.

(*c*) Janitors of elementary schools.

(*d*) Repairs of elementary schools.

(*e*) Total cost of instruction, operation, and maintenance of secondary schools.

(*f*) Salaries of secondary-school teachers.

(*g*) Janitors of secondary schools.

(*h*) Repairs of secondary schools.

2. There is no apparent tendency in the variation of the average cost of—

(*a*) Text-books, stationery, and general school supplies of elementary schools,

(*b*) Fuel of elementary and secondary schools.

Table 94 gives frequency tables based upon the average of the first and second years' figures from thirty cities. It will be noticed that the range is somewhat less, due largely to the fact that there are fewer cases.

The tables for the first year's figures alone are, of course, less reliable than those which give the average for two years, so far as any one city is concerned. However, the greater variability found in these figures for the first year which does not appear where the average for the two years is taken is due largely to the fact that many of the cities which give the extreme variation have not yet reported for two years. In Table 93 for example, the cities reporting 27%, 28%, 49%, and 52%, respectively, for teaching, are cities Nos. 47, 23, 11, and 52, none of which reported for the second year. The variability for the first year's figures is, simply because there are more cases, more nearly a correct representation of the facts of variability, we believe, than the average of the two years where many of the extreme cases are not found. It is remarkable that so small a proportion as 27%

should be devoted to teaching in one case, when other cities use 73% of their funds for this purpose—that some cities should give 2.7 times as great a proportion for teaching as others.

The variation in the proportion which is spent for supervision is not less remarkable. Here the cities seem to divide themselves into groups—those which spend a comparatively large proportion of their money for supervision, and those in which this item is allowed a smaller share of the money. One feels that supervision which costs 17% of the money available for schools should produce remarkable results in the way of saving time and energy for teachers and pupils, if it is to be justified when compared with other cities in which 2% of the budget seems to secure satisfactory supervision.

The range for janitors' salaries may indicate a real difference in the care of school buildings, or, in rare instances, perhaps some connection between ward politics and the janitor's position. Leaving out the most extreme case, it seems rather remarkable that in some instances one dollar out of every eleven available for the maintenance and operation of the schools should be spent for the care of buildings.

That fuel should be allowed in some cities three times as great a proportion of the money spent as in others would not seem strange if our cities were found in sections of the country with very different climatic conditions; but that four or even five times as much should be necessary under conditions which are not greatly different seems preposterous.

Table 94, which is based on the average for two years, gives the most accurate information we have for the thirty cities which reported two years. The limits within which the cases lie are, as has already been noted, somewhat smaller than in the case of the first year's figures considered alone. This is due largely to the fact that we have a smaller number of cases. The variability is, nevertheless, sufficiently striking with a range of from 54% to

73% for teaching, from 2% to 17% for supervision, from 3% to 9% for janitors' salaries, and from 3% to 11% for fuel.

Table 95 gives the variability for the cost per pupil for some of the principal items of the budget. The cost per pupil as given here is based on the average daily attendance.

In the tables given above, we have an expression of the variability in terms of the amount of money spent. We sometimes think of the cities in the region covered by this study as spending a very large amount for public education. The average inhabitant, if not the school officers themselves, of any of these cities will probably say that their school system is quite as good as any other, or at least as good as the average. As a matter of fact, we find a great variability in the total amount per pupil spent, as well as in the amount spent for various items. No one believes that the city which spends $54.00 per pupil furnishes an education six and three quarters times as good as the city which spends only $8.00 per pupil. On the other hand, it hardly seems possible that the opportunity for education in the eight-dollar city can be equal to that found in the fifty-four-dollar city. Teaching and supervision which cost $6.00 per child are hardly likely to be as good as those which cost three, four, five, or even six times as much. No argument based upon the difference in the cost of living could account for so great a difference in the cost of instruction. Either the teachers receive a very much smaller salary in the cities which pay a relatively small amount per pupil, or they have much larger classes to instruct, or both conditions taken together explain the variability.

One may infer that the number of children determines the number of seatings which must be furnished, if not the number and size of buildings; and yet janitors' salaries may cost from 40 cents to $3.00 per pupil, and fuel from 40 cents to $4.70 per pupil.

If we neglect the cases where a very little is spent for text-books

and supplies—the cases where they are not furnished free to pupils—we still find that some cities spend three or four times as much per pupil as others for these articles. It seems rather remarkable that the real value of books and supplies furnished to pupils should vary so much; and even if this were the case, one might question whether the money is spent to best advantage in those cities which spend the larger amounts. Might not a part of this money have been spent to greater advantage in some other way?

The limits within which all of the cases lie are significant, but are not so true a measure of the variability of the group as are the limits within which the middle 50% of the cases lie. A single exceptional case may double the range within which all of the cases lie, but manifestly this does not double the variability of the group. This figure, which we call 2 Q, is found by counting in from both the upper and lower limits until 25% of the cases have been covered, and then finding the range within which the remaining 50% of the cases lie. For instance, in Table 92, in which there are 58 cases, we count off from the lower limit fifteen cases (25% = 14½), which brings us to the group of three cities which spend 58% of their money for teaching; in like manner, counting from the other extreme, 25% of the cases are found to spend more than 67% of their money for teaching. The limits within which the middle 50% of the cases lie are, then, 58 and 67, and 2 Q equals (67—58 = 9) nine. After we have found the 2 Q, the relation which it bears to the median gives us a still better idea of the variability of the group. If it is desired to compare the variability of the group in several traits, the relation of the 2 Q to the square root of the median is more exact than either of the figures before suggested because this measure will be less affected by errors due to inaccuracy of measurements, or to the small number of measurements made. In Table 99 below, 2 Q, the per cent which 2 Q is of the median, and the per cent which

2 Q is of the square root of the median are given. This table is derived from the frequency tables already given.

TABLE 99

MEASURES OF VARIABILITY FOR CITY SCHOOL EXPENDITURES

	2 Q	Per cent. which 2 Q is of the Median	Per cent which 2 Q is of the Square Root of the Median
Per cent of total spent for each item. First year's figures.			
Teaching	9	14	113
Supervision	8	105	290
Janitors' Salaries	1	16	40
Fuel	3	50	123
Per cent of total spent for each item. Average of two years' figures.			
Teaching	9	14	112
Supervision	8	100	283
Janitors' Salaries	4	65	166
Fuel	1	16	42
Cost per pupil. First year's figures.			
Total cost per pupil	7	25	132
Teaching and Supervision	6	33	136
Janitors' Salaries	.7	37	50
Fuel	.8	50	61
Text-books and Supplies	.9	53	69

By calculating the deviations from the medians it will be seen that certain variations in one item are accompanied by like variations in some other item, or that a plus deviation in one item is accompanied by a negative deviation for the other, or *vice versa*. Take, for example, the items of janitors' salaries and salaries for teaching and supervision. In these items one is struck by the fact that a plus deviation in salaries paid janitors is often accompanied by a negative deviation for teaching and supervision, and *vice versa*. Picking out the cases, we have Table 100.

TABLE 100

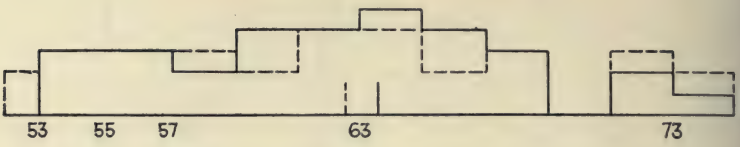
THE RELATION BETWEEN THE AMOUNT SPENT FOR JANITORS' SALARIES AND THE AMOUNT SPENT FOR SALARIES OF TEACHERS AND SUPERVISORS

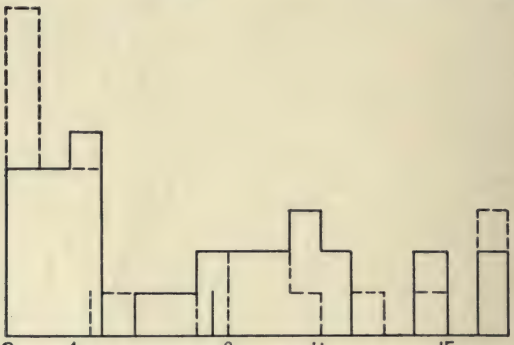
No. of City	Janitors' Salaries	Salaries for Teaching and Supervision
1	+4.	−5.5
7	+3.3	−3.4
9	+1.3	−1.5
11	+3.	−9.9
14	+ .7	−3.6
17	+ .8	− .5
19	+ .6	−5.9
23	+8.7	−13.
27	+1.1	−4.5
28	+1.	−2.
29	+ .8	−6.6
30	+ .1	− .1
31	+ .4	−11.8
34	+1.9	−2.4
43	+1.5	−2.4
47	+2.3	−26.9
52	+ .8	−12.2
56	+2.2	− .2
6	− .9	+5.9
8	− .1	+ .5
10	− .3	+4.3
20	−1.	+2.4
21	− .3	+10.5
22	−2.	+3.9
25	−1.3	+6.7
26	− .3	+1.8
33	− .1	+11.1
36	−2.7	+5.2
37	− .8	+4.9
38	−2.4	+2.8
39	−1.	+2.2
46	−1.6	+1.4
49	−2.2	+4.8
51	− .7	+8.4
57	−1.5	+3.4
58	− .8	+1.6

The gross deviations from the median are significant, especially when deviations for different items are compared with each other as indicated above, but the range of variability is better indicated, I believe, by giving the per cent of the median or other single

figure indicating a central tendency. For example, the median for janitors' salaries (first year's figures, per cent basis) is 6.2%, and for salaries for teaching and supervision it is 71.2%. Now, a deviation of .6% in the case of janitors' salaries seems insignificant when compared with a deviation of 7.1% for teaching and supervision—the one is almost twelve times the other; but when we remember that each one represents a deviation equivalent to about 10% of the median, we are nearer recognizing their real significance, I believe, than when we consider them merely in gross. Even this method of comparison is, however, misleading, since it is absolutely impossible for the items "teaching and supervision" or "teaching" to vary as much as 100% above or below the median when the per cent of the total is taken as the basis of comparison, because the median for teaching and supervision amounts to 70.7% and for teaching to 63.1% of the total. On the cost per pupil basis, while it is not impossible to have a variation equal to 100% of the median, or greater, for these larger items, yet, even if such variations occur, they are not comparable to variations which give the same per cent of the median where this item represents a very much smaller part of the total expenditure. Even after these qualifications (which show us that we must be on our guard in comparing variabilities for different items) have been made, I am still of the opinion that such calculations are very helpful in giving us a correct idea of the variability of all items, as well as permitting us to compare the variability of items whose medians represent about the same proportion of the total, or nearly the same cost per pupil.

In Table 101 the items which apparently show the least variability are "total," "teaching and supervision," and "teaching." As noted above, any deviation above the median is possible; *i. e.* the deviation above the median may be 100% or more of the median. It is striking to note that the deviations expressed as per cents of the median for the total amount spent range from





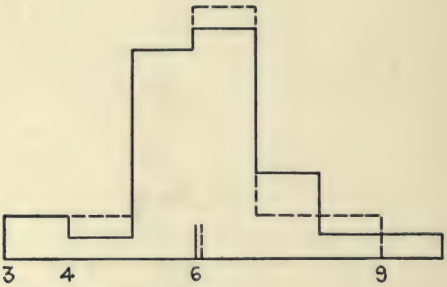
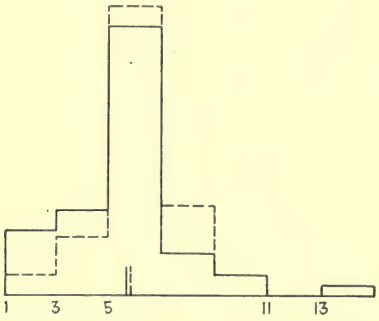
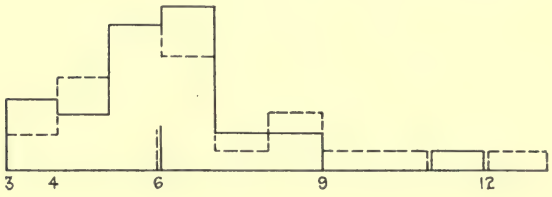


FIG. 24. Teaching
FIG. 25. Supervision
FIG. 26. Teaching and supervision
FIG. 27. Janitors' salaries





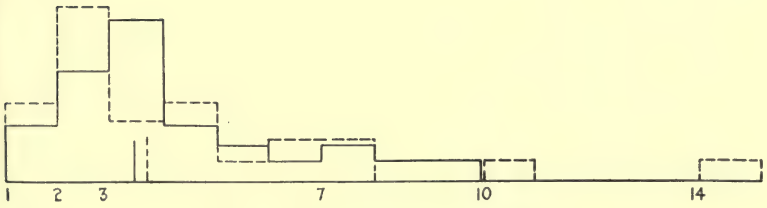
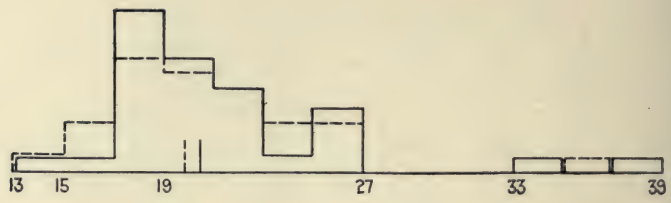
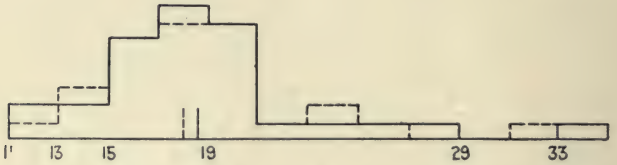
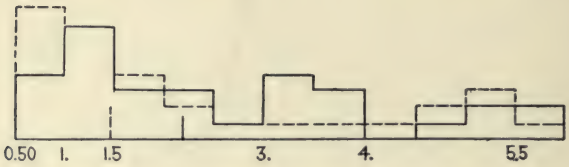
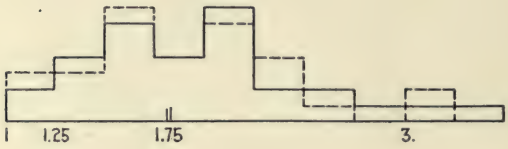


FIG. 28. Text-books and supplies
FIG. 29. Fuel
FIG. 30. Repairs









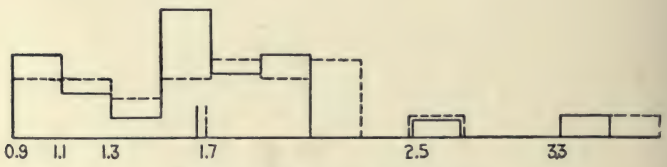
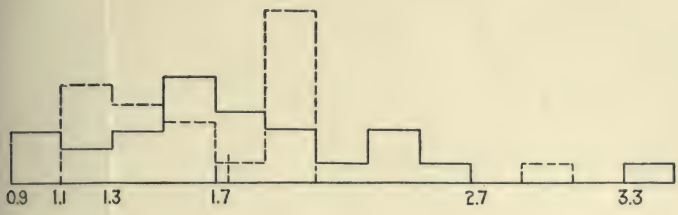


FIG. 31. Teaching and supervision
FIG. 32. Teaching
FIG. 33. Supervision
FIG. 34. Janitors' salaries
FIG. 35. Text-books and supplies



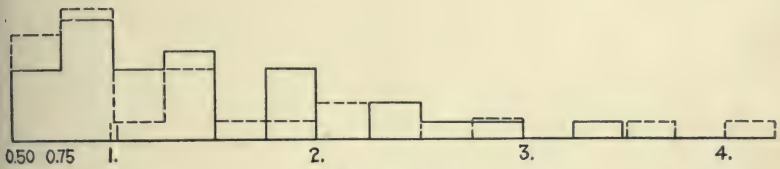


FIG. 36. Fuel
FIG. 37. Repairs

— 30.6% to + 80.2%; while for teaching and supervision the range is from — 35.1% to+88.8%. Apparently the amount paid per child for teaching and supervision is even more variable than the total amount of money spent per child. Possibly this is what we might have expected when we remember that teachers of some sort can be had for almost any salary, while some of the other commodities or utilities which must be had to run the school have a much more definite market value. The great range for supervision from — 73.7% to + 166% is at least partially to be accounted for, I believe, by the fact that no very clear distinction exists between teachers and supervisors or principals in some systems. Those who should have been reported as teachers are, doubtless, in some instances reported as supervisors, and *vice versa*.

The items "janitors' salaries," "text-books and supplies," and "fuel" furnish the best opportunity for comparison of variability. The medians for these items are respectively $1.90, $1.60, and $1.70. The range of deviations for janitors' salaries is from — 42.8% to + 53.5% of the median; for text-books and supplies, from — 42.7% to + 274%; and for fuel, from — 40.9% to + 93.6%.

That the smallest proportional plus variation should be found in the item of janitors' salaries, and the largest for the item of text-books and supplies seems to me to indicate that, in some cities at least, more money means more of those things which make possible efficient work in the schools.

The deviations for the item of repairs show a range of from — 74.8% to + 196.6% of the median. There would probably be less variability in this item if we had the figures for a period of five or ten years, instead of only two years' figures.

Table 102, which gives the deviations from the medians on the per cent basis (the average for two years) reduced to per cent of the median, offers another interesting view of the variability. When we ask how a city spends its money regardless of the amount of money which it has to spend, we are dealing with the problem which every administrator of schools must face. From a median of 70.7% spent for teaching and supervision, we find that the variations range from — 11.7% to + 14.3% of that proportion, while the deviations for teaching alone amount to from — 14.4% to + 16.1%. In these, and in the other items given in this table, we find a smaller range than is found for the same items on the cost per pupil basis. This means, of course, that amount of money per pupil available for maintenance and operation of schools varies much more than does the proportional distribution of that money.

On the basis used in this table, as well as on the cost per pupil basis, we find that the range above the median is less for janitors' salaries than for fuel or text-books and supplies—that of the three, text-books and supplies show the greatest range. The range for janitors' salaries is from—41% to+54.1% of the median; for fuel, from — 40.7% to + 89.8%; for text-books and supplies, from — 94.8% to + 131.6%. In a later section, where the relationship of these items to the total is worked out exactly, the item of text-books and supplies is shown to be more closely corre-

TABLE 101

Deviations from the medians; average cost per pupil for two years reduced to per cents of the medians. The figures refer to per cents and tenths of per cents.

Number of City	Total	Teaching and Supervision	Teaching	Supervision	Janitors' Salaries	Text-books and Supplies	Fuel	Repairs
Medians	28.8	20.5	18.3	2.2	1.9	1.6	1.7	1.1
5	20.5	23.9	34.4	—64.5	21.4	0	40.9	—65.5
6	—9.7	—9.3	—4.9	—46.1	—16.1	6.1	—11.7	56.1
8	10.4	12.2	10.9	23.1	0	18.3	5.8	9.4
13	10.8	13.7	.6	124.0	5.4	6.1	23.4	—28.1
14	0	—3.9	— .6	—36.9	10.7	0	46.8	56.1
15	—11.5	—9.3	—10.4	0	—16.1	0	—5.8	—37.4
16	—1.4	4.4	4.9	0	0	0	0	—9.4
20	—19.8	—15.6	—9.3	—73.7	—32.1	—36.6	23.4	—37.4
27	—9.4	—11.7	—19.1	50.7	5.4	0	—46.8	—18.7
28	3.5	1.5	7.1	—46.1	16.1	—36.6		
29	—5.9	—13.2	—7.1	—64.5	10.7	18.3	—11.7	18.7
30	32.0	30.2	39.9	—55.3	26.7		0	196.6
31	2.1	7.8	—1.1	—64.5	5.4		93.6	112.2
32	8.3	—1.0	—5.5	36.9	5.4	—42.7	17.6	121.6
34	17.0	22.9	18.6	—32.3	69.5		40.9	0
35	—5.6	1.9	8.2	—50.7	—16.1		—5.8	0
36	10.4	24.4	9.3	148.0	—37.4		5.8	—65.5
37	—30.6	—25.9	—35.5	59.9	—42.8		—17.6	—37.4
39	5.6	9.8	3.3	64.5	—10.7		17.6	18.7
40	14.6	9.3	2.7	59.9	—32.1	24.4	46.8	9.4
41	—13.2	—14.6	—17.0	4.6	—37.4	—12.2	0	—56.1
42	0	—16.6	—14.8	106.0	—21.4	61.0	—11.7	—18.7
43	—1.7	0	6.6	—55.3	0	—42.7	0	—28.1
45	0	0	5.5	—41.5	—16.1	6.1	—29.2	56.1
48	—12.2	—14.1	—20.8	41.5	—21.4	0	—11.7	—37.4
52	—3.8	—15.2	—14.8	23.1	10.7	18.3	—35.1	149.0
54	78.8	64.9	52.5	166.0	53.5	274.3	35.1	—74.8
55	—26.4	—35.1	—33.3	—59.9	—42.8	—30.5	—40.9	—65.5
56	2.4	2.9	1.1	36.9	32.1	—30.5	—17.6	18.7
57	80.2	88.8	83.6	134.0	42.8	104.0	17.6	102.8

TABLE 102

Deviations from the medians; average for two years of per cent of total which each item is reduced to per cents of the medians. The figures refer to per cents and tenths of per cents.

Number of City	Teaching and Supervision	Teaching	Supervision	Janitors' Salaries	Text-books and Supplies	Fuel	Repairs
Medians	70.7	63.1	8.0	6.1	5.7	5.9	3.5
5	6.6	16.1	—72.5	9.8	—8.8	20.3	—74.3
6	.4	5.7	—45.0	—1.6	15.8	1.7	85.8
8	2.5	1.4	5.0	—1.6	5.3	—3.4	2.9
13	3.0	—5.9	92.5	3.3	—7.0	11.8	—28.6
14	—3.2	.5	—38.8	21.4	—1.8	37.3	68.6
15	5.7	4.3	11.2	3.3	17.6	5.1	—20.1
16	6.8	7.6	—5.0	8.2	—1.8	3.4	0
20	5.5	14.4	—67.7	—13.2	—22.8	45.8	—14.3
27	—3.7	—11.4	57.7	24.6	22.8	—40.7	2.9
28	—1.4	4.3	—51.2	16.4	—40.4		
29	—7.1	—.5	—62.5	26.3	21.1	—5.1	—40.1
30	—.3	7.4	—67.7	3.3		—22.0	137.2
31	—9.5	—3.0	—66.2	8.2		89.8	122.7
32	—6.5	—13.9	26.2	4.9	—50.9	6.8	102.8
34	—3.0	1.7	—45.0	54.1		11.9	—5.7
35	8.5	15.5	—52.5	—6.6	—94.8	0	8.6
36	14.3	—.8	115.0	—41.0	—87.8	—1.7	—65.7
37	7.8	—6.2	115.0	—14.8		17.0	—2.9
39	4.5	—1.6	48.7	—11.5		10.2	17.2
40	—3.7	—9.7	38.8	—37.7	7.0	23.7	2.9
41	—.9	—3.5	13.7	—26.2	—1.8	13.6	—48.6
42	—1.3	—14.3	96.2	—14.8	59.7	—13.6	—11.5
43	1.8	8.9	—58.7	4.9	—42.2	0	—22.9
45	.7	6.0	—46.2	—9.9	7.0	—33.9	68.6
48	—3.1	—9.0	51.2	—6.6	10.6	—5.1	—22.9
52	—11.7	—10.9	—23.7	4.9	28.1	—39.0	179.8
54	—7.5	—14.4	41.2	—11.5	132.6	—18.8	0
55	—2.1	2.1	—40.0	—8.2	1.8	—13.6	—42.9
56	.7	—3.5	28.7	36.1	—33.3	—25.4	25.7
57	5.4	2.7	21.2	—16.4		—33.9	20.1

lated with the total amount spent than are either of the other items.

As a conclusion to the discussion of variability, it may not be out of place to suggest certain limits within which, in my judgment, the cost per pupil or per cent of total amount spent for each item should lie. Allowing for some difference in the cost of living, it seems to me that the superintendent of schools in any city spending less than $30 per pupil for the maintenance and operation of schools, should investigate in order to find out whether the schools are getting their just proportion of the money spent by the city. This amount seems small when compared with the rates of tuition charged to day pupils in our best private schools, where the tuition even in the lower grades is commonly $100 to $200 per year. It is difficult to place the upper limit for the total cost per pupil, except by saying that the expenditure should be increased to such an extent that the public schools shall be able to do as efficient work as our best private schools. When we compare the meager provision which was made for public education fifty years ago with an expenditure of $54 per pupil reported by one of the cities with which this study deals, we are inclined to feel hopeful for the future. If the superintendent of schools, or other school officer, has seen to it that as much money as possible is provided for the public schools, his next problem is to apportion the money secured among the several items of the budget to the best possible advantage. From the data given above, it is my judgment that an ideal budget would give to each of the principal items not less than the first proportion mentioned in the table below, nor more than that indicated by the last figure, except that cities spending an unusually large amount per pupil should, I believe, spend a relatively larger proportion for teaching and supervision, and for text-books and supplies; while the proportion spent for fuel, repairs, and janitors' salaries should increase much more slowly.

	% of Total		% of Totals
Teaching and Supervision	from 70%	to	75%
Supervision alone	" 7%	"	10%
Teaching alone	" 60%	"	68%
Janitors' Salaries	" 5%	"	7%
Text-books and Supplies	" 4%	"	6%
Fuel	" 5%	"	7%
Repairs	" 3%	"	5%

Teaching and supervision are the most important factors in an effective school system and should, in my opinion, receive a greater rather than a smaller proportion than that usually given. The limits given for supervision are high rather than low, I think. There is a tendency to-day, I believe, to differentiate the work of the supervisor of instruction from that of the class teacher on the one hand, and, on the other, from the mere routine work of the assistant who keeps the office records. This means that a competent supervising principal can do the work of supervision formerly done by five or six men; and that even though he receives a larger salary than was paid any one of the five or six before, the proportion paid for supervision, even when office clerks' salaries are included, has diminished. Janitors' salaries, fuel, and repairs are fixed charges upon the school revenue, which should not much increase in proportion to the amount per pupil available for school purposes.

In a recent bulletin of the United States Bureau of Education the distribution of the money spent ($56,000,000) by one hundred and three cities, each having more than 30,000 population, among the various items of the budget is as shown in Table 103.[1]

The best way to decide just what is the best way to apportion the money among the various items of the budget would be to find out which school system is doing the best work, by testing the pupils in the system, and then to adopt as the ideal apportionment that distribution of moneys which is found in the most efficient school systems.

[1] Harlan Updegraff—*A Study of Expenses of City School Systems.* Bulletin, 1912: No. 5.

TABLE 103

PER CENT OF TOTAL EXPENSES FOR VARIOUS ITEMS OF THE BUDGET FOR ALL CITIES COMBINED

ITEMS	PER CENT
General control	3.45
Elementary schools	76.20
Secondary schools	14.93
Normal, evening, vacation, and special schools	2.75
Miscellaneous expenses	2.67
Total	100.00
Total expenses, general control	3.45
Salaries of teachers, all schools	68.92
Salaries and expenses of supervision, all schools	2.15
Text-books, stationery, and general school supplies, all schools	3.43
Janitors, engineers, and firemen, all schools	6.92
Other expenses of operation, all schools	5.23
Apparatus and equipment, including repairs and replacements thereof, all schools	1.57
Repairs to buildings	5.66
Miscellaneous expenses	2.67
Total	100.00

Relationships

In the discussion of variability given above, it was suggested that a more careful study of the data given would enable us to measure exactly the relationships which exist among the various items of the budget. Such questions of relationship naturally suggest themselves when one considers the distribution of money for different purposes. Do cities which spend a large total amount per pupil spend a correspondingly large amount for teaching? As the amount per pupil increases, is more money spent for every purpose, or are there certain items of expense which do not increase in proportion to the increased cost per pupil? What is the relation between a large amount of money spent for supervision and the amount spent for text-books and supplies, fuel, repairs, etc.? If a larger proportion than usual of the money

available for school purposes is spent for janitors' salaries, what effect may we expect this to have upon teachers' salaries? These and many other similar questions can be answered by determining the relationships which exist among the various items of the budget, on both the cost per pupil and per cent of total bases.

From the tables of deviations of medians given above the fact that relationships exist might, perhaps, be inferred, but no one could from such large tables of details infer the particular relationships which do actually exist. It is just here that the Pearson Coefficient of Correlation is invaluable. The following explanations, adapted from Thorndike's *Educational Psychology* (page 26), will explain the meaning of the coefficient of correlation to the reader not already familiar with its use.

"The coefficient of correlation is a simple figure so calculated from the several records as to give the degree of relationship between any two items which will best account for all the separate cases in the group. In other words, it expresses the degree of relationship from which the actual cases might have arisen with least improbability. It has possible values from + 100 per cent through 0 to — 100 per cent."

A coefficient of correlation of + 100% between two items of the budget (say teachers' salaries and text-books) on the basis of the cost per pupil would indicate that the city which spent the most for teachers' salaries, spent the most for text-books; that the city which spent the least for teachers' salaries, spent the least for text-books; that if the cities were ranged in order according to the amount spent for teachers' salaries, and then in order according to the amount spent for text-books, the two rankings would be identical; that the position of any city with reference to the others for one item will be the same for the other item (both being reduced to terms of the variabilities of the cost per pupil as units to allow comparison).

A coefficient of —100% would, *per contra*, mean that the city

which spent most for one item would spend the smallest amount for the other, that any degree above the average or median in the one would be accompanied by the same degree below the average or median for the other, and *vice versa*. A coefficient of + 62% would mean that (comparison being rendered fair here, as always, by reduction to the variabilities as units) any given station for one item would, on the whole, imply 62 hundredths of that station for the other. A coefficient of —62% would, of course, mean that any position above the average for the one item would, on the whole, involve a position below the average for the other item equal to 62 hundredths of the amount the first was above the average.

Table 104 gives the coefficients which were found on the cost per pupil basis. The first column gives the corrected coefficient [1] as determined from the coefficients found when the first year's figures alone were used, when the second year's figures alone were used, and when the average for the two years was used (see columns 3, 4, and 2). The second column gives the coefficients derived from the average of two years' figures; the third, the coefficients derived from the first year's figures from cities reporting two years; the fourth, the coefficients derived from the second year's figures; and the fifth, the coefficients found when the figures for the fifty-eight cities reporting the first year were used.

In the discussion which follows, the coefficients referred to are always the corrected coefficients, unless it is specifically stated that other coefficients are meant. I believe that the corrected coefficient more nearly expresses the relationship which actually exists among the various items correlated than does any other figure.[2]

[1] This correction is made by using the Spearman formulæ for the correction of the Pearson Coefficient. See *American Journal of Psychology* for January, 1904.

[2] The true relationship between any two items in the budget for these cities is the relationship which would be found if we had perfect measures of the cities' tendencies to spend money for school; such, for instance, as their budgets for forty

TABLE 104

PEARSON COEFFICIENTS OF CORRELATION CALCULATED ON THE COST PER PUPIL BASIS

	Corrected Coefficient (Spearman formulæ used)	Coefficient derived from the average of the first and second years' figures (30 cities)	Coefficient derived from first year's figures for cities reporting two years (30 cities)	Coefficient derived from second years' figures (30 cities)	Coefficient derived from first year's figures for all cities reporting (58 cities)
Total Cost per Pupil correlated with Teaching and Supervision	[1]+1.015	+.97	+.96	+.99	+.88
Total Cost per Pupil correlated with Janitors' Salaries	+ .716	+.66	+.70	+.56	+.73
Total Cost per Pupil correlated with Text-books and Supplies	+ .955	+.85	+.85	+.67	+.64
Total Cost per Pupil correlated with Fuel	[2]+ .522	+.45	+.50	+.34	+.40
Total Cost per Pupil correlated with Repairs	+ .246	+.24	+.47	+.56	+.35
Teaching and Supervision correlated with Janitors' Salaries	+ .746	+.64	+.63	+.44	+.53
Teaching correlated with Text-books and Supplies	+ .737	+.63	+.76	+.35	+.65
Supervision correlated with Text-books and Supplies	+ .869	+.69	+.57	+.51	+.27
Supervision correlated with Repairs	— .128	—.14	+.18	—.09	+.07
Supervision correlated with Teaching	+ .366	+.27	+.31	+.05	+.12
Supervision correlated with Fuel	+ .11	+.06	+.02	+.04	+.01
Janitors' Salaries correlated with Fuel	+ .531	+.30	+.61	—.08	+.45
Janitors' Salaries correlated with Repairs	+ .219	+.32	+.32	+.30	+.24
Repairs correlated with Fuel	+ .147	+.12	+.21	—.001	+.20

[1] That this coefficient as corrected gives over 100% is due to the fact that the third decimal place is lacking in the coefficients from which the correction was made.

[2] The item "fuel" as reported for the two years is less definite than most of the other items, because fuel bought, or at least fuel paid for, one year is often used the next year; consequently, only the second method given by Spearman for the correction of the Pearson coefficient is used. This method is based on the fact that an increase in the number of measures of each of the facts originally measured increases its accuracy.

The first question which our coefficients enable us to answer concerns the relationship of the total cost per pupil to the principal items of the budget. Does an increased cost per pupil mean

or fifty years. The effect of chance deviations of any single year from the cities' general tendencies is to bring the calculated correlation from its true value toward zero. By the Spearman formulæ we estimate the true relationship (1) from the obtained relationship and the amount of deviation of one year's budget from another year's, or (2) from the difference between the relationship obtained from one year's budget and that from two or more years' budgets. For the theory of the correction see, in general, Thorndike, *Mental and Social Measurements*, pp. 128 and 129, and in detail C. Spearman, on "The Proof and Measurement of Association between Two Things," *American Journal of Psychology*, January, 1904.

a proportionate increase in the amount spent for teaching and supervision, for janitors' salaries, for text-books and supplies, for fuel, and for repairs; or is the relationship between the total cost per pupil and the various items of the budget closer for some than for others? Examining our coefficients we find that the relationship between the total cost per pupil and the cost for teaching and supervision is expressed by a coefficient of + 100%, *i. e.* the amount spent for teaching and supervision is determined by the total amount spent per pupil. If a small total amount per pupil is spent, we may expect a correspondingly small amount per pupil for teaching and supervision; if a large total amount per pupil is spent, we may expect a correspondingly large amount per pupil for teaching and supervision; if the cities were ranked in order on the basis of total amount spent per pupil, and then in order on the basis of the amount spent per pupil for teaching and supervision, we would expect to find that the rank of the cities would be the same for each item. The next closest relationship is that for text-books and supplies, which gives a coefficient of + .955. The others are, in order, janitors' salaries, + .716; fuel, + .522; and repairs, + .246. In general, these relationships show that the amount spent per pupil for teaching and supervision, and for text-books and supplies, corresponds very closely to the total amount spent per pupil; if the cost per pupil is above the average we may expect that the amount spent per pupil will be high for these items, and any diminution in the total amount spent per pupil is likely to be accompanied by a smaller expenditure per pupil for these purposes.

The coefficients found for janitors' salaries and fuel show a less close correspondence. From the relationship here we may infer that the rank of any city above or below the median in total cost per pupil might be compatible with various ranks for janitors' salaries or fuel, which would tend to be approximately three-fourths of the rank in total cost per pupil.

The item of repairs is least closely related with the total cost per pupil. This is as we might have expected. The fact that a school system is expensive does not increase the cost of repairing the buildings, except in so far as the labor necessary to do the work may cost more in those cities which are able to spend the large amount per pupil. We might expect the expensive city to keep its buildings in better repair than the poorer cities, which, with the difference in the cost of labor mentioned above, would seem to account for the coefficient of + .246.

The fact that we find a direct relationship between the total cost per pupil and the cost per pupil for each of the principal items of expenditure makes it clear that, in general, an expensive school system is expensive because it spends more money for everything, and that an inexpensive school system is one that retrenches all along the line. However, the fact that certain of the items are less closely related to the total cost per pupil than others does indicate that these items will probably not be found to increase or decrease in a proportion equal to that of the items

TABLE 105

	Total Cost per Pupil	Teachers' Salaries	Supervision	Teaching and Supervision	Janitors' Salaries	Text-books and Supplies	Fuel	Repairs
Average for the five cities nearest the median	$29.00	$17.80	$2.20	$20.00	$1.90	$1.80	$1.90	$1.60
First group of five cities above the median group	31.00	19.20	3.20	22.40	1.80	1.30	1.90	1.30
Second group of five cities	34.10	21.80	2.30	24.10	2.20	1.80	2.20	1.30
The two cities having the greatest expense per pupil	51.70	30.80	5.40	36.20	2.80	4.80	2.20	2.00
Average for the five cities nearest the median	29.00	17.80	2.20	20.00	1.90	1.80	1.90	1.60
First group of five cities below the median	27.70	18.20	1.30	19.50	1.90	1.60	1.50	1.30
Second group of five cities	25.50	15.70	2.40	18.10	1.50	1.60	1.40	.90
The three cities having the smallest expense per pupil	20.80	13.60	1.60	15.20	1.10	1.10	1.50	.60

showing a closer relationship, nor in proportion to the increase in the total cost per pupil.

Table 105 shows just how an increased or a decreased total cost per pupil affects the principal items of the budget. The figures given refer to dollars, and are calculated from the average amount spent for each item for two years. The data are from thirty cities reporting for the school years 1902–1903 and 1903–1904.

Explanation of Table 105

The first line of the table gives the average total cost per pupil and the average amount spent for each of the principal items of the budget, for the five cities which have a total cost per pupil nearest the median total cost per pupil. The next line gives the same information for the group of five cities having the next highest total cost per pupil. The next two lines are explained in like manner. The fifth line repeats the first line. The sixth line gives the average total cost per pupil and the average expenditure for the several items of expenditure for the five cities which have the next lowest total cost per pupil below the median group. The next two lines are explained in like manner.

From this Table 105 the relationships already shown by the coefficients of correlation given in Table 104 are made clear. In general, the table shows that an increased cost per pupil means an increased expenditure for each item, and that a decreased total cost per pupil is accompanied by a decrease in the amount spent per pupil for everything. An increase of two dollars in the total cost per pupil (see line 2) is accompanied by an increase of $2.40 per pupil in amount spent for teaching and supervision, and a decrease in janitors' salaries, text-books and supplies, and repairs, while fuel remains the same. In the next group, however, with an increase in total cost per pupil above the median group of

$5.10, teaching and supervision show an increase of $4.10, janitors' salaries and fuel show an increase of thirty cents each, text-books and supplies remain the same, and repairs decrease thirty cents per pupil. The next group, with an increased total cost per pupil of $22.70, gives an increase for teaching and supervision of $16.20, an increase for janitors' salaries of ninety cents, an increase for text-books and supplies of $3, an increase for fuel of thirty cents, and an increase for repairs of forty cents per pupil.

By examining the part of the table giving the expenditures for groups of cities spending less than the median group, we find the decrease in all items more constant than was the increase for the cities spending more than was spent by the median group. The very fact that the city spends less than the average probably means that it would be very difficult to keep the expenditure in any one item up to the average without eliminating other necessary expenditures. On the other hand, a city spending more than the average can put the additional money in any place where the demand, of one kind or another, may be strongest.

Let us return again to a consideration of the relationships given in Table 104. The relationship (+ .746) between teaching and supervision and janitors' salaries tends to confirm the observation made above with reference to the relation between these items and the total cost per pupil. We may not expect janitors' salaries to correspond so closely to the total cost per pupil as do teachers' salaries. Apparently there are causes other than those (the cost per pupil of teaching and supervision) which influence the amount per pupil spent for janitors' salaries.

The coefficients for teaching and for supervision with text-books and supplies (+ .737 and + .869, respectively), indicate a closer relationship between the cost per pupil for supervision and for text-books and supplies than exists between the cost per pupil for teaching and for text-books and supplies.

That the relationship between supervision and repairs is

negative (+.128) might seem to imply that high-priced supervision means better care of buildings. The coefficient of supervision correlated with teachers' salaries is —.366. This is rather smaller than one might have expected. It is rather natural to suppose that high-priced supervisors would want high-priced teachers, and that a city spending a large amount per pupil for teachers would spend a correspondingly large amount for supervision. The small coefficient found for supervision correlated with fuel (+.11), seems to indicate that while greater expense for supervisors increases the amount spent for text-books and supplies (see coefficient for supervision with text-books and supplies), it has little in common with the expense for fuel.

The relationship between janitors' salaries and fuel, and janitors' salaries and repairs, is expressed by coefficients of + .531 and + .219, respectively. It will be remembered that fuel is more closely correlated with the total cost per pupil than is janitors' salaries. This being true, it would seem that the correspondence between janitors' salaries and fuel might be accounted for by the fact that they are both determined largely by the total amount spent per pupil. It was found also that supervision and repairs show a negative relationship, and here we find a positive relationship between janitors' salaries and repairs nearly equal to the relationship between repairs and the total cost per pupil. Apparently costly supervision means more for economy in repairs than does a large amount per pupil spent for janitors' salaries.

The next table (No. 106) gives the coefficients which were calculated on the "per cent of total" basis.

These coefficients show what effect the spending of a certain proportion of the money available for one item has on the proportion spent for other items.

TABLE 106

PEARSON COEFFICIENTS OF CORRELATION CALCULATED ON THE PER CENT OF TOTAL BASIS

	Corrected Coefficient (Spearman formulæ used)	Coefficient derived from the average of first and second years' figures (30 cities)	Coefficient derived from first year's figures for cities reporting two years' figures (30 cities)	Coefficient derived from second year's figures (30 cities)	Coefficient derived from first year's figures for all cities reporting (58 cities)
Teaching and Supervision correlated with Janitors' Salaries	—.356	—.30	—.25	—.43	—.48
Teaching correlated with Text-books and Supplies	—.746	—.46	—.09	—.59	—.12
Janitors' Salaries correlated with Fuel	—.024	—.03	+.12	—.33	+.26
Janitors' Salaries correlated with Repairs	+.155	+.17	+.12	+.48	+.13
Supervision correlated with Text-books and Supplies	+.203	+.17	+.17	+.27	+.01
Supervision correlated with Repairs	—.409	—.28	—.06	—.38	+.03
Supervision correlated with Teaching	—.983	—.68	—.54	—.69	—.67
Supervision correlated with Fuel	—.333	—.20	—.17	—.03	—.02
Repairs correlated with Fuel	+.195	—.03	+.003	+.12	+.23

In this table the significant thing is not so much the size of the positive or negative coefficients as the order, the *relative* closeness of relationship or opposition among the various items. Rearranging the table on this basis and calling the median relationship zero, and transmuting the others on this basis, we have Table 107.

TABLE 107

		Transmuted Coefficients
Supervision correlated with Teaching	—.983	—.650
Teaching " " Text-books and Supplies	—.746	—.413
Supervision " " Repairs	—.409	—.076
Teaching and Supervision correlated with Janitors' Salaries	—.356	—.023
Supervision correlated with Fuel	—.333	0
Janitors' Salaries correlated with Fuel	—.024	+.309
" " " " Repairs	+.155	+.488
Repairs correlated with Fuel	+.195	+.528
Supervision correlated with Text-books and Supplies	+.203	+.536

I believe that the transmuted coefficients more nearly express the true relationship than do those originally found, for we must

have expected a negative relationship between any two items, because a larger proportion than usual spent for one item leaves a smaller proportion of the total to be divided among the other items of the budget. So far as the coefficients obtained enable us to judge, this negative relationship, due simply to the fact that a larger proportion of money than usual spent for any one item leaves a smaller proportion for other items, is approximately the relationship half-way between the extremes—the relationship between supervision and fuel, — .333. If we call this relationship zero, the transmuted relationships give us, as nearly as we can obtain them, the relationships between the other items freed from this constant error.

Let us consider the transmuted coefficients. Suppose a city spends more than the usual proportion for supervision, what other items may we expect to find receiving an unusual proportion of the money spent? The coefficient of + .536 between supervision and text-books and supplies indicates that the probability is that a city which spends a large proportion for one of these items will spend a large proportion for the other—that we may expect to find some cities unusual both in respect to the proportion spent for supervision and that spent for text-books and supplies. The positive coefficients between janitors' salaries, fuel, and repairs, no matter which two are taken together, shows that in cities where one of these items is proportionately large, the others will probably receive more than the usual proportion. Comparing these coefficients with those found for teaching and supervision with janitors' salaries and supervision with fuel, it is suggested that some boards of education are interested particularly in the physical side—the buildings, their care, etc.—and that the over-emphasis on this side means less money for the purely educational activities. The very large negative coefficient for supervision correlated with teachers' salaries would doubtless be reduced if more accurate reports of the amounts

spent for each of these items were available. It is in this relationship between the two items that any mistakes in reporting in either an amount which really belonged to the other would be most apparent. Any amount reported as teaching which should have been given as supervision would make the amount for teaching too large and the amount for supervision too small, and the opposite would be true if an amount which should have been reported as teaching were given as supervision. In either case such mistakes would make this particular coefficient show a more pronounced negative relationship than actually exists. Such mistakes would not, however, have a like effect on other coefficients, where the increase or decrease in the item of supervision or teaching has no effect on the other item correlated. The fact that the amounts given for teaching or supervision may in one case be slightly too large and in another slightly too small, means that, except when the two items themselves are correlated, the mistake in one direction would be offset by the mistake in the other.

The relationship between teachers' salaries and text-books and supplies (— .413) is particularly interesting when contrasted with the relationship between supervision and text-books and supplies (+ .536). If a city spends an undue proportion for supervision we may expect then an unusually large proportion will be spent for text-books and supplies; while the opposite condition holds for the proportion spent for teaching. Possibly the relationship between supervision and text-books and supplies is simply that the highly paid supervisors are able to get appropriations for books and supplies, and that poorly paid supervisors do not have much to do with the actual use or waste of supplies furnished. On the other hand if there is anything that a good teacher wants, it is plenty of books and supplies of the right quality, consequently it seems strange that there should be this opposition in the relative proportions spent for these two items. However, expensive teachers may effect economy by the proper

use of materials, and poorly paid teachers may be the most careless. There is nothing that hurts a book so little as using it properly, and it is conceivable that the best teachers may actually use fewer supplies than those with less ability.

Table 108 gives the correlation of the first and second year's figures on both the cost per pupil and per cent of total bases. These coefficients give us some idea of the relative stability of the various items of the budget. They are used also in making the Spearman correction.

TABLE 108

First and second year's figures correlated. Thirty cities reporting for the school years 1902–03 and 1903–04.

I—Cost per Pupil Basis

Total cost per pupil	correlated with	total cost per pupil		+.92
Supervision and teaching	correlated with	supervision and teaching		+.89
Supervision	"	"	supervision	+.69
Teachers' salaries	"	"	teachers' salaries	+.79
Janitors' "	"	"	janitors' "	+.90
Text-books and supplies	"	"	text-books and supplies	+.89
Fuel	"	"	fuel	+.17
Repairs "	"	"	repairs	+.34

II—Per Cent of Total Basis

Supervision and teaching	correlated with	supervision and teaching		+.56
Supervision	"	"	supervision	+.58
Teachers' salaries	"	"	teachers' salaries	+.51
Janitors' "	"	"	janitors' "	+.80
Text-books and supplies	"	"	text-books and supplies	+.65
Fuel	"	"	fuel	+.34
Repairs	"	"	repairs	+.54

The total cost per pupil gives a coefficient of + .92, showing that the amount per child spent does not vary much from year to year—the expensive city remains so, and the city spending little does not suddenly devote a much larger proportion of its revenues for schools. Almost as constant as the total cost per pupil are the amounts spent for janitors' salaries, text-books and supplies, teaching and supervision, giving, as they do, coefficients

of + .90, + .89, + .89, respectively. The items of teaching and supervision, when taken alone, show greater variation (coefficients of +.79 and + .69, respectively), due largely to the fact that, in reporting, amounts properly belonging to one item were reported under the other, rather than in a change of policy as to the relative amount to be allowed for teaching and for supervision.

As one might expect, the amount spent for repairs varies more than any of the items mentioned above (a coefficient of + .34 was found). A large amount spent for repairs one year means a smaller amount the next year, rather than an equally large amount. That the coefficient for fuel is as low as + .17, might seem to indicate that fuel in excess of that which is used is often bought and paid for out of a single year's budget, rather than that there is any very great difference in the value of the fuel actually consumed each year.

When we come to consider the proportion of the total which is spent for any one item for two successive years, we find the variability rather greater than for the amount spent per pupil. This is due to the fact that, while the amount per pupil spent for any one purpose remains fairly constant, any additional expenditure for some new item which increases the gross amount spent, or any diminution in any item of expenditure, affects the proportion which this item is of the total amount spent. It is interesting to note that in the relative constancy with which a given proportion is spent for any item, janitors' salaries lead, followed by text-books and supplies, supervision, teaching and supervision, repairs, teaching, and fuel.

Table 109 gives the coefficients for the total cost per pupil correlated with the per cent which each item is of the total. These coefficients tell us what effect a larger or smaller expenditure per pupil may be expected to have on the proportion which is spent for any one item of the budget.

TABLE 109

PEARSON COEFFICIENTS OF CORRELATION

The total cost per pupil correlated with the per cent which each item is of the total. The average cost per pupil and per cent of total for two years is used as the basis of calculation.

Total cost per pupil correlated with per cent of total spent for:

Teaching and Supervision	—.05
Janitors' Salaries	—.06
Text-books and Supplies	+.35
Fuel	—.22
Repairs	+.13

Apparently the total cost per pupil may not be expected to affect the proportion spent for teaching and supervision and for janitors' salaries. Cities spending a large amount per pupil do not necessarily spend any greater proportion of their money for these purposes than do cities spending a smaller amount per child. (The coefficients of — .05 and — .06 are so small as to be practically negligible.) On the other hand, the positive coefficients of + .35 for text-books and supplies indicates that there is a direct relationship between the total amount spent per pupil and the proportion which is spent for this purpose. We may expect an expensive city to spend a larger proportion of its money for text-books and supplies than does the poorer city, even though we may infer from this coefficient that the increase in the proportion spent for this purpose will not be proportionate to the increased cost per pupil. The negative coefficient for fuel shows that the proportion spent for fuel decreases as the total cost per pupil increases. The most expensive city will probably spend a smaller proportion of its money for fuel than a poor city. That the proportion spent for repairs should give a positive coefficient of + .13 when correlated with the total cost per pupil seems to indicate that there is some tendency for the more expensive cities to spend a larger proportion for repairs than the less expensive city—possibly the cities spending the greater amount per pupil do keep their buildings in better repair.

Table 110 gives the average salary received by elementary and by high school teachers, and the average daily wage received by carpenters, bricklayers, and day laborers. This information was calculated from two years' data for the thirty cities reporting for the school years 1902–1903 and 1903–1904. The figure given for elementary and high school teachers' salaries was derived by finding first the average salary paid to each class of teachers for each year separately by dividing the gross amount spent for each item by the number of teachers (see form sent to superintendents), and then the average for the two years was taken. In a similar manner, from the report given by city superintendents on the blank filled out by them, the average wage of carpenters, bricklayers, and day laborers was calculated. The information concerning the daily wage of carpenters, bricklayers, and day laborers is probably less exact than we might wish, but sufficiently accurate, I think, to show whether or not any relationship exists between the amounts paid to this class of laborers and to teachers. It is for the purpose last mentioned that these data are given. Coefficients will be given to show what relationship exists between the wages paid carpenters, bricklayers, and day laborers and the salaries paid teachers.

Before we give the coefficients showing the relationship between teachers' salaries and the wages paid carpenters, bricklayers, and day laborers, it is interesting to note the variability in teachers' salaries, as shown by the table given above. The average salary of the elementary school teachers varies from $350.60 in city No. 27 to $691.30—almost twice as much—in city No. 8. The average salary paid high school teachers varies from $558 in city No. 48 to $1332.80—almost two and a half times as much—in city No. 30. Whatever we may believe about the difference in the cost of living, no one would be willing to maintain that the cost of living in one of the cities is double that in another of those covered by this study. In no case does the

TABLE 110

No. of City	Average High School Teachers' Salary	Average Elementary School Teachers' Salary	Average Daily Wage of Carpenters	Average Daily Wage of Bricklayers	Average Daily Wage of Day Laborers
5	$ 955.5	$643.1			
6	747.1	407.5	$2.50	$3.25	$1.75
8	836.4	691.6	2.50	4.00	2.00
13	930.	540.8	2.62	3.75	1.75
14	820.8	425.9	3.00	4.50	2.00
15	747.9	528.2	3.00	4.00	1.87
16	770.5	386.4	3.12	4.68	1.50
20	736.8	537.2	2.75	4.00	2.50
27	563.3	350.6			
28	931.2	460.4	2.75	3.50	1.50
29	760.9	452.5	2.50	3.25	1.75
30	1,332.8	574.	3.50	4.65	2.25
31	877.6	373.6	2.50	3.50	1.62
32	801.8	538.1	3.25	4.25	2.00
34	819.7	513.2	2.50	3.00	1.50
35	702.8	482.5	3.00	4.00	1.50
36	603.3	487.5	3.87	3.50	1.50
37	657.1	381.7	2.90	4.00	1.85
39	724.9	418.1	2.50	3.25	1.50
40	732.9	366.2	2.50	2.50	1.50
41	663.2	429.1	2.75	4.50	1.75
42	776.5	486.1	2.62	3.30	1.50
43	805.4	499.	2.60	3.55	1.75
45	835.8	504.1	2.62	4.00	1.93
48	558.	415.2	3.00	3.75	1.50
52	876.7	594.5	2.85	4.00	1.50
54	884.2	557.5	3.37	4.25	1.75
55	645.8	399.6	2.75	3.50	1.50
56	887.5	557.	3.50	3.67	2.45
57	1,124.1	662.7	3.50	4.70	2.25

highest daily wage paid a carpenter, bricklayer, or day laborer, as reported, equal double that paid to the poorest paid laborer in any one of these occupations.

The coefficients given above show an increased direct relationship between teachers' salaries and the daily wages paid artisans and day laborers as we go from carpenters, to bricklayers, to

TABLE 111

PEARSON COEFFICIENTS OF CORRELATION

Salaries of teachers correlated with the daily wages of carpenters, bricklayers, and day laborers. The average salary of teachers and the average daily wage for two years are used as the basis of calculation.

Elementary Teachers' Salaries correlated with:	
Carpenters' Wages	+.28
Bricklayers' Wages	+.44
Day Laborers' Wages	+.57
High School Teachers' Salaries correlated with:	
Carpenters' Wages	+.25
Bricklayers' Wages	+.41
Day Laborers' Wages	+.57
High School Teachers' Salaries correlated with Elementary Teachers' Salaries	+.63

day laborers. If the wages paid to day laborers are an index of the cost of living, we may infer that cost of living does enter as a determining factor in the amount paid to teachers; not that the amount of salary paid to the teacher corresponds exactly to the cost of living, but that the tendency will be for cities where living is high to pay rather more than the average salary, and for cities where the cost of living is below the average, to pay its teachers less than the average.

TABLE 112

Coefficients of correlation calculated on the cost per pupil basis, the figure used in finding the cost per pupil being half-way between the average number of pupils in daily attendance and the average daily enrollment. Forty-nine cities, reporting for the year 1902–1903.

Total cost per pupil	correlated with	Teaching and Supervision	+.93
" " "	" "	Janitors' Salaries	+.82
" " "	" "	Text-books and Supplies	+.71
Teaching and Supervision	" "	Janitors' Salaries	+.65
Teaching	" "	Text-books and Supplies	+.66
Supervision	" "	" " "	+.34
"	" "	Repairs	+.15
"	" "	Teaching	+.15
Janitors' Salaries	" "	Fuel	+.40
" "	" "	Repairs	+.45

If these coefficients are compared with those given for the first year's figures, they will be found to agree in the main with them. Whatever variation is found is due largely to the fact that on the basis on which this table is computed, nine cities had to be omitted because they did not furnish the necessary data for the average daily enrollment.

Table 113 which follows, shows the relation between the proportion of pupils attending elementary and high schools, and the proportion of the total amount spent for salaries which is used for the salaries of the two classes of teachers. The table also gives the number of students enrolled per teacher, which offers another basis for comparison as between elementary and high school teachers. The number of pupils as given in this table is in every case the average as found from two years' total enrollment figures. In determining the number of teachers, and in determining the amount of money spent for each group, kindergarten teachers and teachers of special subjects, such as nature study, manual training, etc., are counted as elementary school teachers.

Explanation of Table 113

The first column gives the average total number of pupils enrolled in all day schools; the second, the number enrolled in elementary schools, including kindergartens; the third, the number enrolled in high schools. The fourth, fifth, and sixth columns give total amount spent for all day school teachers' salaries, the amount spent for elementary school teachers' salaries, including the salaries of kindergarten and special teachers, and the amount spent for high school teachers' salaries, respectively. The seventh and eighth columns give the per cent of the total number of pupils enrolled who are enrolled in the elementary school, and the per cent of the total amount spent for teachers' salaries which

is spent for the salaries of elementary school teachers. The ninth and tenth columns give the same information for high schools. The eleventh and twelfth columns give the number of pupils enrolled per teacher in both elementary and high schools.

The proportion of the total expenditures, or of the amount spent for salaries, which is spent for the teachers of one class or the other has little significance, except as we are able to compare it with the proportion of the total number of pupils which are enrolled in each class of school. That a city spends 18% of the total amount spent for maintenance and operation for high school teachers' salaries, means one thing when the city enrolls 17% of its total number of pupils in high schools, and quite another thing when the city enrolls 8.5% of the total number in high schools.

The number of pupils enrolled in the elementary schools varies from 71% to 96% of the total number of pupils enrolled, while the money spent for the salaries of elementary school teachers varies from 56% to 91% of the total amount spent for salaries of day school teachers. The median for elementary teachers' salaries is 78.8% of the total amount spent for salaries, while the median for the enrollment in elementary schools is 90.1% of the total enrollment in day schools.

For high schools the variability for the proportion of total enrollment has a range of from 4% to 29%, while the high school teachers receive from 9% to 44% of the money devoted to teachers' salaries. The median for high school teachers is 21.2% of the total amount spent for salaries, while the median for the enrollment in high schools is 9.9% of the total enrollment in day schools. In seventeen out of twenty-nine cases, the proportion of the total amount spent for salaries which is spent for high school teachers' salaries is two, three or even four times the proportion which the high school enrollment is of the total enroll-

ment. Of the remaining twelve cases, seven show a proportionate expenditure for high school teachers' salaries almost double the high school's proportion of the total number of pupils.

The number of pupils enrolled per teacher in the elementary schools varies from 35 to 54, while in the high schools the number varies from 17 to 43. The median number of pupils per teacher is 44 for the elementary schools, and 27 for the high schools. In general, the enrollment per teacher for the elementary schools is about one and one-half times the enrollment per teacher in the high schools.

If we may take the amount spent for salaries as an index of the relative cost of high and elementary school education, we must conclude from the data given above that secondary education costs two, three, or even four times as much per pupil as elementary education. What we would like to have is the expenditures for high schools separate from those for elementary schools in order to be entirely certain of the relative cost of elementary and secondary education. I believe, however, that the item of salaries is a good index, first, because the item of salaries forms from 60% to 80% of the entire budget; and, second, because other expenditures for books, supplies, and apparatus are enough larger, in proportion to the number of pupils enrolled, in the high school to offset an expenditure of the same amount per pupil for janitors' salaries, fuel, repairs, etc.

TABLE 113

Number of City	Total Number of Pupils Enrolled; Average for Two Years	Number of Elementary School Pupils; Average for Two Years	Number of High School Pupils; Average for Two Years	Total Amount Spent for Teachers' Salaries; Average for Two Years	Amount Spent for Elementary School Teachers' Salaries; Average for Two Years	Amount Spent for High School Teachers' Salaries; Average for Two Years
5	4,286	3,796	490	86,850	65,350	21,500
6	2,200	1,911	289	31,128	22,396	8,732
8	2,436	2,139	297	39,570	30,845	8,725
13	4,049	3,765	284	60,395	51,545	8,850
14	1,738	1,598	140	25,932	28,957	4,975
15	5,587	5,038	549	75,531	62,137	13,394
16	1,220	1,136	84	17,285	13,432	3,853
20	2,969	2,662	307	42,436	33,184	9,252
27	2,167	1,831	336	22,595	16,413	6,182
28	2,231	2,143	88	28,583	23,927	4,656
30	3,747	3,428	319	76,185	59,628	16,557
31	3,651	3,433	218	43,992	36,193	7,799
32	2,999	2,728	271	41,268	35,268	6,000
34	1,867	1,684	183	30,843	24,285	6,558
35	5,162	4,407	755	82,351	66,891	15,460
36	1,633	1,350	283	24,439	18,102	6,337
37	3,255	2,886	369	30,491	23,262	7,229
39	1,981	1,641	340	30,652	22,362	8,290
40	2,138	1,510	628	30,963	17,402	13,561
41	4,533	4,022	511	54,086	42,803	11,283
42	4,214	3,798	416	48,937	37,687	11,250
43	3,094	2,636	458	46,301	36,244	10,057
45	4,142	3,867	275	60,237	48,537	11,700
48	1,161	1,098	63	12,099	10,424	1,675
52	4,978	4,680	298	58,192	50,555	7,637
54	1,949	1,803	146	38,300	31,650	6,650
55	2,440	2,201	239	21,762	18,200	3,562
56	2,126	2,029	97	39,725	36,175	3,550
57	3,072	2,692	380	74,495	55,645	18,850

TABLE 113 (*Continued*)

Number of City	Per Cent of the Total Number of Pupils who are Enrolled in Elementary Schools; Average for Two Years	Per Cent of the Total Amount Spent for Salaries; that is, Spent for Elementary Teachers' Salaries; Average for Two Years	Per Cent of the Total Number of Pupils who are Enrolled in High Schools; Average for Two Years	Per Cent of the Total Amount Spent for Salaries; that is, Spent for High School Teachers' Salaries; Average for Two Years	Number of Pupils per Teacher for Elementary Schools	Number of Pupils per Teacher for High Schools
5	88.5	75.2	11.5	24.8	43	22
6	86.9	72.0	13.1	28.0	50	25
8	87.7	77.9	12.3	22.1	47	27
13	93.	85 3	7.	14.7	38	30
14	91.8	80.9	8.2	19.1	35	23
15	90.1	82.3	9.9	17.7	48	31
16	93.1	77.6	6.9	22.3	35	17
20	89.6	78.3	10.4	21.7	49	28
27	84.4	72.6	15.6	27.4	47	31
28	96.1	83.7	3.9	16.3	44	18
30	91.4	78.2	8.6	21.8	38	26
31	94.1	82.2	5.9	17.8	38	24
32	90.9	85.4	9.1	14.6	47	36
34	90.1	78.8	9.9	21.2	39	23
35	85.4	81.2	14.6	18.8	38	34
36	82.8	74.2	17.2	25.8	42	27
37	88.5	76.3	11.5	23.7	54	34
39	82.9	72.8	17.1	27.2	37	30
40	70.6	56.2	29.4	43.8	49	34
41	88.8	79.1	11.2	20.9	47	30
42	90.2	77.0	9.8	23.0	56	29
43	85.3	78.3	14.7	21.7	40	36
45	93.4	80.6	6.6	19.4	43	19
48	94.7	86.1	5.3	13.9	48	21
52	94.0	86.9	6.	13.1	50	35
54	92.5	82.6	7.5	17.4	35	20
55	90.2	83.6	9.8	16.4	54	43
56	95.4	91.1	4.6	8.9	46	24
57	87.7	74.7	12.3	25.3	38	22

CONCLUSION

This section will give a brief general summary of the results which have already been obtained, and some practical suggestions which grow out of these facts. First, with regard to variability, it will be remembered that the cost per pupil for the maintenance and operation of schools in the cities considered varies from $9 to $55. That this variation in the total cost per pupil is not due entirely to the relative wealth or poverty of the different communities is shown conclusively when we know that the cost of schools in cities in the United States varies from 6% to 46% of the total city expenditure. An equally striking variability is found in the cost per pupil for each of the principal items of expense. Even when cities spending about the same amount per pupil are considered, it is found that the distribution of the money among the several items seems not to show anything like the degree of uniformity which might be expected. It is found that the percentage of the total cost of maintenance and operation which is spent for teaching and supervision varies from 44% to 82%; and what possibly seems more astonishing is the fact that the city spending the smallest proportion for teaching and supervision, spends the smallest total amount per pupil. Janitors' salaries amount to from 3% to 9% of the budget; one city spends 3% of its money for fuel and another spends 12% for the same purpose; text-books and supplies cost from 1% to 13% of the total cost of maintenance and operation.

Fuel costs three times as much per pupil in one city as in another. The expenditure per pupil for the salaries of high school teachers varies from one and one half to four times the cost per pupil for salaries of teachers in the elementary schools.

In our consideration of relationships we found that an expensive school system is one that spends more than the usual amount for all of the principal items of expense. A large positive relation-

ship exists between the proportion spent for supervision and the proportion spent for text-books and supplies. A lack of relationship between the total cost per pupil and the proportion which is spent for teaching and supervision seems to indicate that additional expenditures may not mean, as they should, a greater proportion for those items which count most for the efficiency of the schools.

These and the many other facts which are given above concerning the variability and interrelation of the principal items of expense for schools, prove conclusively that the problem of the business administration of city school systems is not only a real and vital one, but also that we may expect that the schools will increase in efficiency when the money devoted to public education is distributed among the various items in the best possible way. As has been stated, our final test can only be found by testing the pupils in the schools in order to rate different systems for efficiency, and then we must conclude that those cities which get the best results for a given expenditure per pupil are the cities which properly distribute their money. However, before any such comparison among the various cities can be made, we must have more detailed information with regard to the way in which the money is used. If we may not ask city superintendents or boards of education to report their expenditures according to a certain fixed form, it does seem that we might insist that their reports tell us for just what purposes the money is spent. A report which gave the various items of expense in detail would enable any one to compare cities according to whatever classification seemed best. Nor would such reports be without their value to the persons making them. If the administrator of schools is to secure additional money, either for purposes for which money is already used, or for any new field of activity, he can have no better argument than to be able to show just what results are obtained in his own and other cities from a

given expenditure. Suppose, for example, that a superintendent wishes to introduce manual training or domestic science; he will be met immediately by the statement that these "fads" are expensive and not at all necessary as a part of public education. Now, if it were possible for him to show from the reports of other cities that the additional expenditure was comparatively small, and that results obtained in the way of retaining pupils in school were considerable, he could make an argument which would have some weight.

If the greatest economy is to be had, it is essential that the accounting should show just how much money is spent for each item, and, within a system itself, how various schools compare. It should be possible for the administrative officer to tell just what the cost per pupil is for each school within the system, and to compare the relative cost with the relative efficiency as found by testing the pupils of each school. No great corporation would to-day continue to spend money for purposes for which no results could be shown, and no school system should so report its expenditures that it is impossible to tell how much the educational policies cost which it advocates and carries out.

It seems hardly right to expect that a superintendent whose time is already overcrowded, and who has as his assistant a clerk worth $500 a year, should be asked or expected to originate or carry out any such policy of accounting as has been suggested above. But when we recall again the great variability which is found for those items of expense which might be expected to be fairly constant, we feel that it is not out of place to suggest that the salary of a competent business agent or director might be paid out of the savings which would be made by the proper administration of the business affairs of the schools, and that the efficiency of the schools might be increased as the result of the proper distribution of the money spent. When the best judgment is used in the purchase and use of supplies and equipment as well as in

the selection of teachers and supervisors of instruction, when the money which is spent for schools is properly distributed among the various items of the budget, when expenditures are shown in reports in connection with the results obtained, then our schools will be found to have improved in efficiency, and then they will be able to command the respect and increased support of the community.

§ 23. Expenditures for Schools in Relation to Other Municipal Expenditures

The fiscal problem in education involves not only a consideration of the proper administration of the funds set aside for schools, but also the possible increase in revenue devoted to education. The greater demand made upon our public schools, due to the development of superior facilities for the type of education which has long been thought necessary and to the very great increase in the number and kind of activities undertaken by our schools, has led everywhere to an increase in school expenditures. The study of the fiscal problem when viewed merely from the standpoint of expenditure may be summed up in an accurate and detailed statement of the results secured for the money spent. From the standpoint of increasing school revenue the problems must be stated in terms of school needs in relation to amount of increase in revenue desired.

If the resources of our society were unlimited the problem of securing adequate support for education would be very simple. A need once recognized would be met by a grant of sufficient funds. As the situation actually is the ability of any community to satisfy the demand for increased support for schools must be judged in terms of the whole community fiscal problem. Many American communities are poor, some are, for various reasons, almost bankrupt. The ability to raise money is limited. Of the total amount of revenue collected only a part can be spent for schools. It is quite as important for a community to maintain a police force and a fire department as it is to have schools. Money spent for paving, sewage systems, hospitals, proper handling of contagious disease, inspection of meat and milk and the like, cannot advantageously be withdrawn for any other use.

The expedient of rendering the schools independent of the general municipal government by creating a board with power to levy and collect taxes as well as to manage the schools, seems to

the writer to be open to serious criticism. It is true that under this form of control schools may receive, for a time at least, more money than they could hope for from the general administration. It has often been contended that our schools have almost invariably been administered honestly. Granting both of these arguments, the fact remains that the schools represent only one type of community activity and ought not to draw from the resources of the community to such an extent as to cripple other agencies of vital importance to the welfare of the group. Then, too, there is an undoubted value in placing those who administer schools in a position in which they are called upon to justify the use of money already granted and to show clearly the needs which lie back of the demand for increased support. We may not hope for the highest type of efficiency from any man or group of men who lack the stimulus which is found in a close and continual scrutiny of their public acts. School boards and school superintendents are not exceptions to this rule.

The only adequate study of city expenditures, with special reference to the money spent for schools, is Professor E. C. Elliott's "Some Fiscal Aspects of Education." The remainder of this section will consist mainly of tables of results from this investigation. Professor Elliott's data were secured from the bulletins, numbers 36 and 42, of the Department of Labor issued in September 1901 and 1902 and from bulletin 20, of the Bureau of the Census issued in 1905. The classification used by the Department of Labor is modified and improved in the later publication of the Bureau of the Census but not so greatly as to invalidate comparisons among the results secured from the two sets of data. The following parts of tables from Professor Elliott's study give the two classifications and at the same time show the data derived from the original data expressed as percentages of the total amount expended instead of amount in dollars as found in the original tables.

TABLE

SHOWING PERCENTAGES OF TOTAL AMOUNT EXPENDED FOR MAINTENANCE AND OPERATION ALL CITIES IN THE UNITED STATES

	City	Police Department	Police Courts, Jails, etc.	Fire Department	Health Department	Hospitals, Asylums, Almshouses, etc.	Schools	Libraries, Art Galleries, Museums, etc.	Parks and Gardens	Sewers	Municipal Lighting
1	New York, N. Y.	10.15	.791	4.66	.924	4.66	14.9	.555	1.72	.648	2.45
2	Chicago, Ill.	19.30	1.460	8.30	.878	.04	31.8	.894	3.30	2.00	2.19
3	Philadelphia, Pa.	14.30	2.640	5.02	1.480	2.49	17.1	1.33	2.63	.432	5.75
4	St. Louis, Mo.	17.80	1.270	8.01	.420	6.14	16.8	.453	1.29	1.12	5.72
5	Boston, Mass.	8.66	6.660	6.26	.824	6.16	15.4	1.61	2.50	1.88	3.77
6	Baltimore, Md.	11.20	2.770	5.84	.995	4.07	15.4	.034	3.29	.418	5.22
7	Cleveland, Ohio	8.64	1.910	9.83	1.540	2.73	23.7	1.65	.786	.694	5.15
8	Buffalo, N. Y.	13.10	.406	11.00	.725	2.60	19.1	1.65	3.21	.197	5.79
9	San Francisco, Cal.	14.80	1.980	9.88	1.660	3.82	20.9	.754	2.66	.824	3.94
10	Cincinnati, Ohio.	9.88	1.840	8.13	.677	3.45	17.3	1.13	.611	.696	5.56
11	Pittsburg, Pa.	8.07		7.85	1.310	2.25	13.5	1.03	2.88	1.11	4.75
12	New Orleans, La.	5.60	1.330	6.24	1.190	1.18	10.4	.173	.205		5.14
13	Detroit, Mich.	16.00	.341	14.60	1.030	2.09	23.9	1.79	2.89	1.41	
14	Milwaukee, Wis.	9.32	.507	11.40	.979	.36	21.1	1.60	1.86	1.40	6.25
15	Washington, D. C.	13.00	6.790	4.60	1.350	7.50	21.7	.140	1.16	1.39	4.62
16	Newark, N. J.	8.55		5.88	1.190	4.25	18.3	.713	.0937	1.27	4.37
17	Jersey City, N. J.	9.94	.234	5.28	.176	.73	11.0	.763	.142	.448	3.99
18	Louisville, Ky.	9.77	3.770	8.96	.301	2.23	17.9		1.70	.497	4.87
19	Minneapolis, Minn.	7.36	.537	11.20	.842	3.03	25.6	1.43	2.51	1.26	5.12
20	Providence, R. I.	9.56	.120	9.41	.451	1.06	17.9	.331	1.19	1.74	8.04
21	Indianapolis, Ind.	9.02	.160	10.10	.722	2.42	33.2	2.82	4.48	4.77	6.73
22	Kansas City, Mo.	11.90	1.160	11.90	1.960	.16	26.5	.963	2.39	.424	4.06
23	St. Paul, Minn.	7.70	1.640	8.25	.377	1.00	19.0	.615	2.40	.714	8.06
24	Rochester, N. Y.	5.54	.435	6.68	1.240	3.15	16.1	.077	.787	.0997	7.87
25	Denver, Col.	7.56	.724	8.35	1.520	1.87	37.2	1.27	3.64	.831	5.88
26	Toledo, Ohio	6.96	1.870	7.57	1.040	(a)	25.9	.732	1.17	.872	5.14
27	Allegheny, Pa.	6.85		6.67	.763	3.55	17.3	1.15	1.37	.754	
28	Columbus, Ohio	7.05	1.010	9.56	1.290	.66	22.5	.522	.535	.658	3.53
29	Worcester, Mass.	5.65		6.36	1.110	5.56	21.2	1.58	1.04	11.5	4.61
30	Syracuse, N. Y.	7.57	.735	9.22	.817	5.86	21.8	1.93	1.91		5.90
31	New Haven, Conn.	13.50	.967	9.78	.538	5.25	26.6	1.13	1.41	.798	5.46
32	Paterson, N. J.	9.99	.299	10.10	.584	5.22	25.2	1.56	2.44	.954	6.41
33	Fall River, Mass.	8.54		7.57	.933	8.22	18.1	1.01	.186		6.01
34	St. Joseph, Mo.	12.60	1.250	12.90	1.680	.41	28.4	1.22	1.14	.825	
35	Omaha, Neb.	5.42	.739	8.11	.539	.30	25.6	1.29	1.29	1.93	5.32
36	Los Angeles, Cal.	9.57	.719	9.14	.914	.29	32.7	1.39	4.08	.306	3.27
37	Memphis, Tenn.	11.20		9.41	7.460	3.55	15.9	.698	.229		5.17
38	Scranton, Pa.	8.05	.519	7.39	.709		48.6	1.42	.641	1.03	6.37
39	Lowell, Mass.	10.20		8.69	2.34	9.27	24.7	1.05	.959	1.16	6.56
40	Albany, N. Y.	11.40	.461	9.92	.929	4.81	22.5	.416	2.56	.124	5.12
41	Cambridge, Mass.	5.71		4.17	.922	4.89	21.4	.700	.928	4.30	3.25
42	Portland, Ore.	4.94	.305	7.40	.320	.37	22.9		.807	.366	4.32
43	Atlanta, Ga.	13.70		10.60	10.60	4.83	14.5	.481	1.38	.586	7.09
44	Grand Rapids, Mich.	7.94	.968	11.40	1.260	2.12	28.1	.694	2.16	.739	
45	Dayton, Ohio	7.84	1.630	8.65	.584	1.39	32.7	1.02	.245	.258	5.19
46	Richmond, Va.	8.38	.337	7.45	.743	3.24	10.6	.411	3.02	.152	2.58
47	Nashville, Tenn.	10.60	.501	10.20	2.220	2.55	20.7	.310		.124	5.63
48	Seattle, Wash.	5.84	.733	7.94	.934	.38	18.9	1.06	.501	.305	1.94
49	Hartford, Conn.	9.24	.652	9.06	.915	6.64	24.2	.827	1.83	.591	4.31
50	Reading, Pa.	9.38		6.51	.505		28.2	.528	1.77	4.67	9.08
51	Wilmington, Del.	12.40	.614	5.71	1.200	.13	25.9	1.04	2.02	.526	7.06
52	Camden, N. J.	13.40	.611	10.20	.476	1.35	24.7	.132	.159	.136	9.58
53	Trenton, N. J.	11.20	.470	9.81	.716	2.29	21.1	.573	1.57	.942	2.65
54	Bridgeport, Conn.	8.27	1.070	9.98	.921	8.07	23.4	1.73	2.68	.863	7.51
55	Lynn, Mass.	6.14		7.18	.857	7.79	18.4	1.77	.511	.888	3.94
56	Oakland, Cal.	12.80	1.200	11.40	1.430	.30	37.6	1.82	1.33	.673	8.62
57	Lawrence, Mass.	7.33		6.68	4.950	7.83	21.2	1.48	.716	.953	4.07
58	New Bedford, Mass.	11.00		7.22	.769	5.66	20.2	1.42	1.89	.788	4.93
59	Des Moines, Iowa.	5.96	.791	9.71	1.900	.34	40.7	1.14	2.10	1.99	6.85
60	Springfield, Mass.	5.12		7.96	.498	4.39	26.7	2.40	1.98	.409	4.89
61	Somerville, Mass.	5.33		5.39	.933	3.13	25.0	1.22	.934	.839	4.76
62	Troy, N. J.	11.60	.469	6.60	1.340	10.60	18.7		.269	.466	7.67
63	Hoboken, N. J.	14.10	.444	9.96	.705	2.36	24.0	1.05	.588	.743	3.30
64	Evansville, Ind.	9.15	427	10.20	.499	.17	31.9		.196	.404	5.77
65	Manchester, N. H.	6.53	.452	13.00	1.290	3.33	18.7	.839	.866	.59	8.96
66	Utica, N. Y.	6.28	.363	10.70	1.200	2.57	24.3	1.04	.437	.706	9.53
67	Peoria, Ill.	9.56	2.440	9.81	1.140		31.4	1.82	1.95	.942	7.21
68	Charleston, S. C.	12.70		8.30	2.000	11.50	12.3	.081	1.05	1.53	4.90

(a) Less than .01.

1 Percentages obtained from data published in Bulletin 36 of

DEVOTED TO EACH OF THE MUNICIPAL DEPARTMENTS FOR THE FISCAL YEAR 1900 1
ABOVE 30,000 POPULATION

Street Cleaning and Sprinkling	Other Street Expenditures	Garbage Removal	Interest on Debt	Waterworks	Gas-works	Electric-light Plants	Docks and Wharves	Ferries and Bridges	Markets	Cemeteries	Baths	Other Items	
4.10	1.84	1.04	13.12	3.22			.656	.360	.067		.048	33.69	1
3.02	1.50	2.25	6.73	6.36		1.54	.101	1.030	.017		.054	7.27	2
1.63	3.59	2.96	10.90	7.79			.024	5.210	.023		.495	19.30	3
3.32	3.57	2.15	8.66	6.70			.660	.379	.073			14.50	4
2.67	7.32	3.16	11.10	6.47				2.040	.142	.332	.572	12.40	5
2.67	2.19	2.22	20.10	3.62			.056	.286	.069		.054	19.50	6
1.20	1.99	1.50	14.40	5.89				2.250	.450	.648		15.10	7
2.98	4.02	1.86	10.90	5.86			.756	.179	.230	.001	.01	15.40	8
2.70	3.13		.25					.096				32.50	9
3.29	1.68	.42	28.90	7.85			.080	.445	.221			7.83	10
2.47	4.25	1.40	12.40	4.65			.382	.757	.288			30.80	11
2.94	.26	2.49	14.70									48.20	12
4.69	11.50	1.79	8.64	3.60		3.34		.589	.070			1.71	13
5.16	3.80	4.80	9.22	4.46			.078	1.720			.325	15.80	14
3.48	6.42	1.14	8.43	3.32				.651	.134		.020	14.10	15
2.54		1.38	8.37	6.96					.415		.121	35.70	16
1.47	2.99		23.20	8.96			.073					30.70	17
3.60	5.59		17.60	4.91			.279					17.90	18
5.90	2.03		12.90	3.74				.365				16.30	19
1.73	5.57	.698	20.50	2.64				.636		.626		17.90	20
5.36	1.54	2.53	7.72	.18				.301	.632			11.80	21
4.41	1.15	.94	12.00	8.48				.238	.088			11.50	22
4.34	3.36	.88	22.50	3.47				2.730				12.80	23
3.10	1.89	2.69	21.80	2.58				.595		1.120		24.20	24
4.18	.952	.52	7.60					.017	.382			17.40	25
2.53	4.79	.81	21.10	4.81	1.24			1.380	.513	.626		11.30	26
2.73	5.53	1.59	14.00	12.50		4.21	.170		.321			20.70	27
3.96	.82	.81	21.10	6.91		.020			.451			18.50	28
2.90	8.72	.70	14.90	2.56							.020	11.50	29
5.01	3.66	4.05	15.20	5.52				1.610	.275	.077	.283	8.63	30
6.45	3.89	.39	10.50					.772				12.40	31
4.60	5.09	2.78	12.30									12.50	32
2.54	7.17	2.01	8.29	9.66						1.380		18.30	33
2.46	4.81		15.80			5.58		.206				10.70	34
1.62	2.52		20.20						.148			24.90	35
6.49	5.91	.82	4.89									19.40	36
3.06	10.33		18.60				.766	2.350	.668			10.60	37
1.85	2.06	.43	8.06					.694				12.30	38
2.35	2.21	1.41	13.70	6.38						.709		8.09	39
2.49	2.27	.03	16.60	9.23				.377	.118			10.70	40
2.79	7.06	2.49	14.70	3.37				2.360		.826	.061	19.90	41
3.18	1.00	.36	27.00	3.66								23.00	42
	4.20		14.50	5.87				.145		.837		11.00	43
3.69	.68	.44	7.50	8.93		2.22		.154	.373	1.950		18.70	44
2.31	2.61	2.05	19.80	4.46				1.580	.669			7.02	45
2.81	3.36	1.62	30.90	3.14	11.90			.292	.497	.717		7.60	46
1.62	6.81	3.74	20.60	6.82					.343			7.17	47
.854	2.05	.06	20.30	7.14			.181	.035				30.60	48
4.72	13.6	1.87	13.10	4.59				.835		422	.181	2.61	49
2.26	3.84	2.83	8.37	8.32					.157			13.50	50
2.35	3.34	4.18	13.50	9.27							.038	10.70	51
1.57	3.77	1.09	16.70	9.49								6.54	52
2.43	2.11	1.46	20.10	7.46								15.10	53
3.48	6.19	3.28	9.12					.575				13.00	54
1.55	6.21	2.61	15.40	4.68						2.190		19.60	55
6.94	2.64		3.39				.429					9.44	56
2.38	5.48	1.37	13.00	7.22				.371		1.300		13.60	57
1.10	5.51	2.24	16.90	4.45			.624	.168		2.89	.071	11.90	58
2.24	1.46		4.59					1.950		1.24	.151	16.90	59
3.43	3.32	1.80	11.10	3.94								22.20	60
1.62	6.09	1.89	6.29	5.73				.039				31.20	61
9.86	.63	4.55	7.92	8.65			.013	.641	.040	.096		10.40	62
1.61	.25	.48	8.49	21.10						.475	.203	10.00	63
1.64	1.32	.62	18.60	7.14			.111	.077	.311			11.40	64
2.15	12.20	2.68	13.10	3.88						1.980		9.50	65
4.00	1.72	1.73	3.15					.328			.065	29.10	66
2.62	3.53	.12	8.89				.021	1.440				17.20	67
	5.15	3.84	25.4						.056			10.80	68

The Department of Labor, September, 1901.

TABLE

SHOWING PERCENTAGES OF TOTAL PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES CITIES BETWEEN 25,000

	CITIES	General Administration	Courts	Police Department	Militia	Fire Department	Health Department
1	Schenectady, N. Y.	11.54	.67	11.87		9.22	1.40
2	Youngstown, Ohio.	8.21	.05	13.41		9.92	2.56
3	Holyoke, Mass.	10.32	.13	7.18	.001	10.66	2.25
4	Fort Wayne, Ind.	6.83	.28	9.34		15.77	2.11
5	Akron, Ohio.	6.64	.13	8.05	.09	17.00	1.04
6	Saginaw, Mich.	9.24	.67	8.54		7.27	.57
7	Tacoma, Wash.	6.45	. 25	6.51		8.73	.82
8	Covington, Ky.	11.28	1.17	10.25		9.10	1.72
9	Lancaster, Pa.	7.77		1.08		7.69	.72
10	Dallas, Tex.	7.66	.49	9.90		11.02	.18
11	Lincoln, Nebr.	8.08	.35	4.69		8.71	.82
12	Brockton, Mass.	9.37		7.44	.32	9.20	1.59
13	Pawtucket, R. I.	8.86	.07	8.10		6.81	.63
14	Birmingham, Ala.	7.52	.69	12.32	.07	13.45	1.97
15	Little Rock, Ark.	12.08	.90	16.78		15.05	1.96
16	Spokane, Wash.	7.96	.42	5.35		10.27	1.18
17	Altoona, Pa.	8.93		5.36		9.01	.83
18	Augusta, Ga.						
19	Binghamton, N. Y.	8.69	1.19	7.62		6.79	1.28
20	Mobile, Ala.						
21	South Bend, Ind.	7.94	.32	9.49		13.88	.29
22	Wheeling, W. Va.	8.17	.12	11.22		13.47	1.47
23	Springfield, Ohio	7.88	.65	7.57		8.99	2.22
24	Johnstown, Pa.	6.10		8.85		5.89	1.53
25	Haverhill, Mass.	6.29		6.98	.19	9.98	.97
26	Topeka, Kan.	7.52	.37	6.76		11.52	2.23
27	Terre Haute, Ind.	6.37	.27	8.84		19.43	3.33
28	Allentown, Pa.	7.09		6.00		9.61	2.10
29	McKeesport, Pa.	9.90		11.18		10.30	3.34
30	Dubuque, Iowa	8.43	.01	8.20		10.08	.61
31	Butte, Mont.	9.15	.51	13.73		12.48	1.26
32	Davenport, Iowa.	6.60	.36	7.34		13.52	.87
33	Quincy, Ill.	5.93	.37	8.03		15.55	.36
34	Salem, Mass.	7.18		8.62	.79	7.57	3.61
35	Elmira, N. Y.	11.35	1.21	8.18		12.90	1.92
36	Malden, Mass.	5.09		5.94	.11	5.68	2.11
37	Bayonne, N. J.	9.46	1.49	13.13	.11	2.99	.90
38	Superior, Wis.	13.53	.41	6.88		18.37	2.98
39	York, Pa.	6.53		8.65		9.85	1.05
40	Newton, Mass.	7.67		7.73	.05	5.14	.87
41	East St. Louis, Ill.	8.82	1.13	8.72		9.98	.87
42	Springfield, Ill.	8.55		11.75		15.48	.85
43	Chester, Pa.	9.24		9.30		7.10	5.22
44	Chelsea, Mass.	5.78		7.92	.06	6.94	1.69
45	Fitchburg, Mass.	6.37		8.31	.07	8.26	1.48
46	Knoxville, Tenn.	8.10		8.07		12.38	4.33
47	Rockford, Ill.	5.32	.26	7.00		12.07	.67
48	Sioux City, Iowa.	8.08	.33	6.80		7.38	.84
49	Montgomery, Ala.	6.05	.42	13.07		8.10	3.05
50	Taunton, Mass.	6.90	.19	8.71	.19	6.22	1.90
51	Newcastle, Pa.	8.09	.08	6.75		10.75	.77
52	Passaic, N. J.	8.96	1.35	6.11	.10	8.29	1.36
53	Atlantic City, N. J.	7.96	.82	11.58	.01	14.25	1.67
54	Canton, Ohio.	5.88		8.25		11.19	1.44
55	Jacksonville, Fla.						
56	Galveston, Tex.	8.54	.26	9.78		12.15	1.52
57	Auburn, N. Y.	9.38	1.15	7.01		10.52	.92
58	Racine, Wis.	6.24	1.03	4.13		14.14	1.19
59	South Omaha, Neb.	12.16	.89	7.12		9.52	1.21
60	Joplin, Mo.	8.84	.60	9.89		13.85	.92
61	Joliet, Ill.	6.92		10.29		9.49	1.98

From bulletin of Bureau of Census No. 20.

DEVOTED TO EACH OF THE ITEMIZED PURPOSES. AVERAGE FOR THE FISCAL YEARS 1902 AND 1903. AND 50,000 POPULATION

Miscellaneous Public Safety	Charities and Corrections	Public Highways	Municipal Lighting	Public Sanitation	Schools	Libraries, Museums, etc.	Public Recreation	General	Corporate Interest	Service Transfers	
	4.21	4.83	7.85	10.65	21.70	.63	.24	.84	14.28	.03	1
.35	2.64	3.86	5.51	6.86	37.05	1.02	.47		8.13		2
	7.82	7.02	3.90	4.39	26.66	1.36	1.23		14.32	3.36	3
.33	.05	4.89	8.28	6.00	33.02	1.35	3.06		8.83		4
.06	3.30	7.79	8.08	1.48	37.05	1.73	.60		6.89		5
	3.23	14.37	3.93	3.62	36.05	1.07	.32		12.05		6
	.24	6.63		1.33	28.50	.98	2.01	1.92	35.70		7
	3.10	4.44	6.41	6.11	24.70	1.20	.03		20.37	.08	8
	.54	12.26	13.95	5.97	32.32		.13		8.64	.09	9
	3.85	12.18	5.50	3.63	22.80	.81	.74	.29	20.85		10
	.10	3.26	4.06	2.81	40.80	1.46	.02		24.77	.08	11
	8.69	9.98	4.53	5.28	25.06	1.66	.40	1.24	12.81	2.52	12
.28	2.94	9.25	5.61	4.27	23.75	1.33	.47		25.06	2.61	13
.08	1.94	10.96	3.60	4.14	13.72	.04	.63		28.57	.31	14
	3.88	9.03	2.27	1.71	30.30		1.21		3.48	1.18	15
	1.71	8.48	1.74	1.77	29.65	.48	1.60	3.60	25.83		16
.84		8.28	5.09	2.95	38.40				20.25	.02	17
No	data for	schools									18
.30	13.35	9.30	9.12	2.79	31.90	.001	1.03		6.73		19
No	data for	schools									20
.31		7.61	7.35	5.22	32.30	1.13	2.15	.48	11.65	.05	21
	1.68	4.88	7.84	6.12	33.67	1.71			9.15	.58	22
.05	2.81	4.00	12.43	7.98	31.90	1.38	1.96		10.23		23
.20	4.71	11.85	6.44	.001	47.05		.55		6.87		24
.05	13.62	10.40	6.61	2.31	25.76	2.24	1.71	.07	12.50	.27	25
	.56	9.86	3.72	1.60	41.76	1.22	.61		12.36		26
.16	.51	2.69	7.71	5.59	39.35	.73	.49		4.41		27
.45	.10	8.19	7.45	3.39	42.88		.08		12.60		28
.30	1.20	5.96	6.23	3.79	35.43	.94			11.22		29
		8.09	7.22	4.56	29.98	1.33	.45		21.02		30
.02	.84	8.71	4.08	3.55	36.35	2.79	.05		6.20	.34	31
.18		9.42	8.16	7.79	37.10	.95	3.22		4.51		32
	1.96	4.79	7.13	4.20	29.56	1.52	2.69		18.05		33
.45	17.65	5.86	7.68	3.66	25.22	2.33	2.33		6.97		34
.02	3.95	9.95	8.77	2.37	25.75	.51	1.72	.02	11.33		35
	6.26	9.33	4.71	3.63	27.80	2.29	.42	14.72	11.26	.61	36
	.87	6.43	7.34	2.14	32.77	.87	.40		21.07		37
	1.79	9.87	3.65	1.30	36.45	1.40			3.42		38
.06	.70	9.19	9.03	7.59	37.55	.12	.79		8.84		39
	3.74	10.74	5.12	4.55	21.58	1.55	.65	9.43	20.69	.57	40
		13.91	4.04	2.03	33.75	1.00	.05		15.65		41
.70	1.13	3.68	7.29	3.70	28.11	.93	3.34	1.57	12.85	.01	42
	4.45	3.75	8.16	3.44	34.92		.80		13.75		43
.33	9.98	7.02	5.30	4.37	24.03	.92	.65	13.98	9.60	1.31	44
	11.79	11.35	6.82	3.07	26.28	1.59	.82	.32	13.35	.02	45
	3.59	6.39	8.37	3.52	19.75				25.54		46
	.73	6.88	9.10	5.85	40.70	3.43	.26		7.68		47
	.02	8.36	4.10	6.62	30.01	.68	.61		26.12		48
	2.10	7.78	5.41	3.43	12.87	.30	.79		34.25	2.43	49
.35	9.52	11.23	3.09	2.36	25.75	1.66	.71	.30	17.85	3.13	50
	5.97	7.95	1.17	3.67	47.25		.04		7.60		51
.15	3.86	6.90	6.82	3.98	37.77	1.50	1.77	1.31	9.76		52
.22	4.46	5.20	6.74	13.30	16.76	.54	.33	1.13	15.16		53
.32	1.19	3.53	8.69	6.92	35.79	.90	1.33	.12	14.79		54
No	data for	schools									55
	8.85	5.69	1.77	7.64	20.25	.31	.30		22.95		56
	7.96	8.42	9.27	4.54	29.50	.62	.04		7.49	3.22	57
	4.17	13.27	5.28	.21	39.20	3.03	.03		8.00		58
	1.67	4.62	6.06	.18	40.17	.08	.17		16.31		59
	.74	10.30		.18	44.50	1.71	.01	1.60	6.95		60
.80	.79	7.12	7.47	6.63	38.42	1.91	2.00		6.17		61

TABLE 115

SHOWING PERCENTAGES OF TOTAL PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES CITIES BETWEEN 25,000

	CITIES	General Administration	Courts	Police Department	Militia	Fire Department	Health Department
62	Chattanooga, Tenn.	7.83	.57	12.19		15.72	3.02
63	Woonsocket, R. I.	6.76	.06	8.24		8.35	1.79
64	Sacramento, Cal.	8.50	.85	8.90		9.66	1.12
65	La Crosse, Wis.	10.45		6.91		13.39	.86
66	Oshkosh, Wis.	9.88	.50	5.52		15.67	1.69
67	Newport, Ky.	8.86	.26	8.53		5.26	2.56
68	Williamsport, Pa.	9.42		4.97		12.48	1.13
69	Pueblo, Col.	11.02	.20	8.00		6.83	2.29
70	Council Bluffs, Iowa.	6.17	.77	5.96		16.73	.12
71	New Britain, Conn.	5.46	.82	6.23		10.28	3.51
72	Cedar Rapids, Iowa.	6.45	1.10	6.68		8.97	2.27
73	Lexington, Ky.	15.66	1.01	12.03	.02	9.53	1.80
74	Bay City, Mich.	14.55	.72	8.92		10.68	.24
75	Fort Worth, Tex.	7.15	.30	7.62		8.78	.53
76	Easton, Pa.	7.40		6.35		9.12	.40
77	Gloucester, Mass.	11.37		7.88	.20	9.53	1.83
78	Jackson, Mich.	9.03	.95	8.16		13.32	.91

From the tables given above are derived tables of frequency, measures of variability and of relationship. The tables which follow are marked "L", for those derived from the data of the bulletins of the Department of Labor, and "C", for those derived from the data of the bulletin of the Bureau of the Census.

TABLE 116 (L)

TABLE OF MEASURES OF VARIABILITY OF PERCENTILE EXPENDITURES FOR MAINTENANCE AND OPERATION. ALL CITIES IN THE UNITED STATES ABOVE 30,000 POPULATION. FISCAL YEARS 1900 AND 1901

	50 % of the cases lie between			2 P. E.
Police Department (average)	6.93%	and	9.82%	1.89
Police Department, Courts, Jails, etc. (1901)	7.43	"	11.22	3.79
Fire Department (average)	6.72	"	9.70	2.98
Municipal Lighting (1901)	4.39	"	6.72	2.33
Libraries, Museums, etc. (average)	.66	"	1.40	.74
Health Department (average)	.7	"	1.6	.9
Parks (1901)	.54	"	1.90	1.36
Schools (average)	19.65	"	30.58	10.97
Interest on Debt (average)	8.84	"	19.15	10.31

(*Continued*)

DEVOTED TO EACH OF THE ITEMIZED PURPOSES. AVERAGE FOR THE FISCAL YEARS 1902 AND 1903. AND 50,000 POPULATION

Miscellaneous Public Safety	Charities and Corrections	Public Highways	Municipal Lighting	Public Sanitation	Schools	Libraries, Museums, etc.	Public Recreation	General	Corporate Interest	Service Transfers	
.18	7.52	3.90	6.70	5.19	17.90	.16	2.03	.17	16.85		62
	5.75	10.09	5.91	3.68	20.57	.24	.09	3.15	22.27	2.99	63
.21	.36	12.60	8.05	8.39	35.30	2.46	1.20		2.33		64
.06	.06	5.23	5.79	3.17	39.27	.55	.31	6.59	7.48		65
	3.74	12.93	5.62	1.56	33.57	2.26	.78	.06	6.35		66
.09	3.54	6.09	6.94	5.22	26.04	1.44	.05		35 42		67
	8.09	6.24	7.56	2.25	35.94		.88		10.80		68
	.46	11.50	4.04	1.61	33.27	.80	3.81	.15	12.52	3.44	69
.26	.14	5.07	4.72	2.27	42.82	1.50	2.30		11.12		70
		6.30	6.19	6.04	38.26		.94		15.90	.06	71
	.01	13.65	6.53	3.57	38.45	1.90	1.84	.45	8.16		72
	8.64	5.38	7.82	2.60	22.30	.49	.06		12.65	.01	73
	.29	9.46		4.80	33.61	1.05	.57		15.18		74
.16	1.01	10.36	1.03	.76	18.45	.89	.33		37.15	5.41	75
		10.36	.39	2.60	50.87	1.15	.07		11.25		76
.18	13.38	13.39	3.80	.91	22.50		.40		13.78		77
.03	6.10	12.85	6.52	4.79	27.60	1.49	.50		7.49	.80	78

TABLE 117 (C)

TABLE OF MEASURES OF VARIABILITY OF PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. SEVENTY-FIVE CITIES BETWEEN 25,000 AND 50,000 POPULATION. AVERAGE OF FISCAL YEARS 1902 AND 1903

	50 % of the cases lie between			2 P. E.
General Administration	6.76%	and	9.24%	2.48%
Police Department	6.98	"	9.49	2.51
Fire Department	8.71	"	12.99	4.28
Health Department	.87	"	1.98	1.11
Charities and Corrections	.79	"	5.75	4.99
Public Highways	6.00	"	10.30	4.30
Street Lighting	4.10	"	7.71	3.61
Public Sanitation	2.37	"	5.22	1.85
Schools	25.75	"	37.10	11.35
Libraries	.73	"	1.55	.77
Public Recreation	.29	"	1.20	.91
Interest on Debt	8.13	"	15.99	5.86

TABLE 118 (L)

TABLE OF MEDIANS, AVERAGE DEVIATIONS, STANDARD DEVIATIONS, AND COEFFICIENTS OF VARIABILITY. PERCENTILE EXPENDITURES FOR MAINTENANCE AND OPERATION. FISCAL YEARS 1900 AND 1901. ALL CITIES IN UNITED STATES ABOVE 30,000 POPULATION

	Median		Average Deviation		Standard Deviation		Coefficient of Variability	
	1900	1901	1900	1901	1900	1901	1900	1901
Police Department	8.02	8.28	2.17	2.30	2.96	2.59	.767	.799
Police Department, Courts, Jails, etc	8.82	8.88	2.49	2.37	3.37	3.20	.839	.795
Fire Department	8.23	8.46	1.99	1.80	2.45	2.28	.693	.619
Health Department	.93	1.07	.56	.79	.91	1.40	.583	.768
Schools	23.60	24.96	6.39	6.30	8.09	7.56	1.32	1.06
Libraries, etc	1.02	1.02	.48	.44	.58	.55	.483	.442
Parks	1.04	1.04	.84	.80	1.16	1.06	.82	.784
Street Lighting	5.51	5.56	1.69	1.65	2.15	2.10	.719	.696

TABLE 119 (C)

TABLE OF MEDIANS, AVERAGE DEVIATIONS, STANDARD DEVIATIONS, AND COEFFICIENTS OF VARIABILITY. AVERAGE PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. FISCAL YEARS 1902 AND 1903. CITIES BETWEEN 25,000 AND 50,000 POPULATION

	Median	Standard Deviation	Average Deviation	Coefficient of Variability
General Administration	8.08	2.06	1.54	.54
Police Department	8.16	2.38	1.74	.609
Fire Department	9.98	3.31	2.58	.817
Health Department	1.40	.997	.747	.633
Charities and Corrections	3.02	4.04	2.98	1.71
Public Highways	8.19	2.99	2.52	.908
Street Lighting	6.43	2.35	1.84	.725
Public Sanitation	3.67	2.43	1.78	.927
Schools	32.30	8.34	6.67	1.175
Libraries	1.14	.727	.56	.524
Public Recreation	.61	.92	.642	.814
Interest on Debt	12.50	7.79	5.75	1.62

TABLE 120 (L)

TABLE OF PEARSON COEFFICIENTS OF CORRELATION. PERCENTILE EXPENDITURES FOR MAINTENANCE AND OPERATION FOR THE FISCAL YEARS 1900 AND 1901. ALL CITIES IN THE UNITED STATES ABOVE 30,000 POPULATION

	1900	1901	Average of 1900 and 1901
Schools with—			
Police Department	+.0256	—.149	—.069
Police Department, Courts, etc.	—.0459	—.15	—.0679
Fire Department	+.203	+.065	+.0969
Health	—.0243	—.205	—.0145
Libraries and Museums	+.279	+.315	+.293
Parks	+.031	+.065	+.0156
Street Lighting	+.354	+.336	+.344
Interest on Debt			—.482
Other Expenditures			—.288
Street Lighting Department with Police Department			+.0685
Fire Department with Police Department, Courts, etc.			+.139

TABLE 121 (L)

TABLE OF PEARSON COEFFICIENTS OF CORRELATION. PER CAPITA EXPENDITURES FOR MAINTENANCE AND OPERATION. ALL CITIES IN THE UNITED STATES ABOVE 30,000 POPULATION. FISCAL YEARS 1900 AND 1901

Schools with—	1900	1901
Police Department, Courts, etc.	+.232	+.319
Fire Department	+.444	+.389
Street Lighting	+.333	+.361
Assessed Valuation of Real and Personal Property		+.45

TABLE 122 (C)

TABLE OF PEARSON COEFFICIENTS OF CORRELATIONS. AVERAGE PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. FISCAL YEARS 1902 AND 1903, ALL CITIES BETWEEN 25,000 AND 50,000 POPULATION

Schools with—	
General Administration	—.094
Police Department	—.367
Fire Department	+.088
Health Department	—.187
Charities and Corrections	—.371
Public Highways	—.0004
Street Lighting	+.246
Public Sanitation	—.246
Libraries and Museums	+.30
Public Recreation	—.054
Interest on Debt	—.541

TABLE 123 (L)

TABLE SHOWING GENERAL GROUP RELATIONSHIPS. SELECTION OF CITIES BASED ON PERCENTILE EXPENDITURES FOR SCHOOLS, AND MADE FROM ALL CITIES IN UNITED STATES HAVING A POPULATION OF 30,000 AND OVER. FISCAL YEAR 1901

Highest ten cities in percentile school expenditures:

Number of City	Schools	Street Lighting	All Street Expenditures Except Lighting	Interest on Debt	Fire Department	Police Department, Courts, Jails, etc.
111	46.8	8.26	7.05	12.80	4.57	8.18
87	44.16	7.20	3.21	5.69	10.86	9.27
114	38.80	2.79	9.02	5.08	7.30	7.65
81	42.49	5.40	7.48	14.50	8.21	10.90
38	41.40	6.14	9.81	7.43	7.50	8.13
56	40.90	8.74	8.17	3.26	10.50	9.99
113	39.74	8.46	4.95	13.52	8.04	5.58
75	38.80	10.80	12.22	6.56	9.66	9.71
100	38.41	4.99	6.43	2.79	14.44	15.54
119	37.69	11.32	7.77	9.70	6.85	10.18
Median,	41.15	7.73	7.62	6.12	8.12	9.85
Average,	41.42	7.41	7.61	8.13	8.79	9.51

Lowest ten cities in percentile school expenditures:

37	15.40	5.40	14.43	17.60	10.00	11.10
43	14.32	6.48	8.74	12.31	10.11	12.15
17	13.90	4.48	6.76	27.61	6.70	11.71
5	13.07	3.60	11.65	15.49	5.87	13.17
99	12.30	4.18	7.36	28.91	9.28	14.34
68	12.76	4.49	6.64	25.66	7.94	14.78
12	11.12	5.03	3.69	18.60	6.20	6.24
133	10.26	5.54	8.80	30.85	7.84	11.45
46	9.83	2.71	8.02	29.78	7.34	8.60
80	6.96	1.96	11.80	29.45	5.52	7.29
Median,	12.53	4.49	7.06	28.26	7.59	11.58
Average,	11.99	4.39	8.49	23.63	7.68	11.08

TABLE 124 (C)

TABLE SHOWING GENERAL GROUP RELATIONSHIPS. SELECTION OF CITIES BASED ON PERCENTILE PAYMENTS FOR SCHOOLS, AND MADE FROM CITIES IN UNITED STATES HAVING A POPULATION OF 30,000 TO 50,000. AVERAGE FOR FISCAL YEARS 1902 AND 1903

Highest ten cities in percentile school expenditures:

Number of City	Schools	General Administration	Police Department	Fire Department	Health Department	Charities and Corrections	Public Highways	Street Lighting	Public Sanitation	Libraries, Museums, etc.	Public Recreation	Interest on Debts
76	50.87	7.40	6.35	9.12	.40		10.36	.39	2.60	1.15	.07	11.25
51	47.25	8.09	6.75	10.75	.77	5.97	7.95	1.17	3.67		.04	7.60
24	47.05	6.10	8.85	5.89	1.53	4.71	11.85	6.44	.01		.55	6.87
60	44.50	8.84	9.89	13.85	.92	.74	10.30		.18	1.71	.01	6.95
28	42.88	7.09	6.00	9.61	2.10	.10	8.19	7.45	3.39		.08	12.60
70	42.82	6.17	5.96	16.73	.12	.14	5.07	4.72	2.27	1.50	2.30	11.12
26	41.76	7.52	6.76	11.52	2.23	.56	9.86	3.72	1.60	1.22	.61	12.36
11	40.80	8.08	4.69	8.71	.82	.10	3.26	4.06	2.81	1.46	.02	24.77
47	40.70	5.32	7.00	12.07	.67	.73	6.88	9.10	5.85	3.43	.26	7.68
59	40.17	12.16	7.12	9.52	1.21	1.67	4.62	6.06	.18	.08	.17	16.31
Median,	42.85	7.46	6.76	10.18	.87	.73	8.07	4.72	2.44	1.46	.13	11.19
Average,	43.88	7.68	6.94	10.78	1.08	1.63	7.83	4.80	2.26	1.51	.41	11.75

Lowest ten cities in percentile school expenditures:

1	21.70	11.54	11.87	9.22	1.40	4.28	4.83	7.85	10.65	.63	.24	14.28
40	21.58	7.67	7.73	5.14	.87	3.74	10.74	5.12	4.55	1.55	.65	20.69
63	20.57	6.76	8.24	8.35	1.79	5.75	10.09	5.91	3.68	.24	.09	22.27
56	20.25	8.54	9.78	12.15	1.52	8.85	5.69	1.77	7.64	.31	.30	22.95
46	19.75	8.10	8.07	12.38	4.33	3.59	6.39	8.37	3.52			25.54
75	18.45	7.15	7.62	8.78	.53	1.01	10.36	1.03	.76	.89	.33	37.15
62	17.90	7.83	12.19	15.72	3.02	7.52	3.90	6.70	5.19	.16	2.03	16.85
53	16.76	7.96	11.58	14.25	1.67	4.46	5.20	6.74	13.30	.54	.33	15.16
14	13.72	7.52	12.32	13.45	1.97	1.94	10.96	3.60	4.14	.04	.63	28.57
49	12.87	6.05	13.07	8.10	3.05	2.10	7.78	5.41	3.43	.30	.79	34.25
Median,	19.10	7.75	10.68	10.69	1.73	4.01	7.09	5.66	4.35	.31	.33	22.61
Average,	18.36	7.91	10.25	10.75	2.02	4.32	7.59	5.25	5.69	.52	.60	23.77

In his analysis of the causes of variability in percentile expenditure for schools Professor Elliott calls attention to many possible causes operating, of course, in varying degree, among the several cities making up the group studied. He expresses most adequately the lack of scientific management of municipal affairs in the following paragraph:

"A municipality is seldom economical in the expenditure of its revenues. It is far more often either parsimonious or extravagant. The recognition of the principle of expediency is much

more frequent than that of real worth, or of final utility. The cost of public service is doubled because of the price often paid to mediocrity, or on account of the tribute levied under a system of political feudalism. And this price is paid by reason of civic inertia and impotence, or because the standards of good service are not known. The social income is spent according to standards that *were* or *are*, and not according to standards that *ought to be*. A city is not a machine, and any description of the forces that make for progress or otherwise must keep in mind that human beings make up, and human minds direct, municipal affairs and set up civic standards."

Along with the study of school expenditures in relation to expenditures for various other sorts of municipal activity there is need for a companion study of sources of revenue. An interesting example of a partial study of this aspect of the fiscal problem is found in the report of the Commission Appointed to Study the System of Education in the Public Schools of Baltimore. The Commission found that Baltimore did not expend for its schools nor for its municipal affairs generally as much as the average or normal city. The following table and explanation taken from the report of this commission is suggestive.[1]

[1] Report of the Commission Appointed to Study the System of Education in the Public Schools of Baltimore. United States Bureau of Education, Bulletin, No. 4, 1911.

TABLE 125

TOTAL AMOUNTS AND AMOUNTS PER CAPITA RECEIVED FROM EACH OF THE PRINCIPAL SOURCES OF REVENUE IN 1908

[The amounts are taken from special reports of the Bureau of the Census: Statistics of Cities, 1908, pp. 192–193; the population figures from p. 343.]

No.	Cities	Estimated Population	All Receipts		Taxes		Licenses and Permits	
			Total	Per Capita	Total	Per Capita	Total	Per Capita
1	Chicago, Ill.	2,092,869	$41,546,465	$19.95	$31,843,470	$15.25	$8,608,914	$4.12
2	St. Louis, Mo.	665,802	13,799,932	20.71	11,773,339	17.67	1,495,724	2.25
3	Cleveland, Ohio ...	523,187	9,345,285	17.88	7,628,341	14.59	1,329,358	2.54
4	Baltimore, Md.....	549,079	8,963,040	16.32	7,518,725	13.69	902,959	1.65
5	Detroit, Mich.	426,592	7,037,586	16.49	5,457,955	12.79	867,432	2.03
6	Buffalo, N. Y.....	405,714	7,499,983	18.49	6,556,446	16.18	709,633	1.75
7	San Francisco, Cal..	402,836	9,385,013	23.35	7,073,395	17.55	1,582,537	3.93
8	Milwaukee, Wis. ..	350,852	6,142,214	17.50	4,859,602	13.87	869,525	2.48
9	Newark, N. J.....	322,784	5,826,020	18.07	3,732,374	11.57	615,199	1.91
10	New Orleans, La. .	329,207	5,848,151	17.79	4,771,561	14.50	734,212	2.23
11	Washington, D. C..	321,128	12,168,378	37.93	5,169,874	16.12	644,750	2.01
12	Los Angeles, Cal. ..	270,491	5,273,272	19.53	3,446,268	12.78	717,594	2.66
13	Minneapolis, Minn.	286,241	4,633,924	16.20	3,868,398	13.55	483,334	1.69

No.	Cities	Estimated Population	Fines and Forfeits		Subventions and Grants for Education		Other Subventions and Grants and Gifts	
			Total	Per Capita	Total	Per Capita	Total	Per Capita
1	Chicago, Ill.	2,092,869	$548,790	$0.263	$340,585	$0.164	$204,706	$0.099
2	St. Louis, Mo.	665,802	107,020	.161	283,243	.425	140,585	.211
3	Cleveland, Ohio ..	523,187	23,901	.457	251,565	.481	111,115	.213
4	Baltimore, Md.....	549,079	9,569	.174	531,787	.969		
5	Detroit, Mich.	426,592	12,334	.289	670,119	1.570	29,746	.069
6	Buffalo, N. Y.....	405,714	35,020	.086	145,798	.359	53,086	.131
7	San Francisco, Cal..	402,836	33,718	.084	674,194	.167	19,683	.048
8	Milwaukee, Wis. ..	350,852	56,105	.160	263,393	.751	93,589	.238
9	Newark, N. J.....	322,784	23,672	.073	1,360,293	.421	94,482	.293
10	New Orleans, La. .	329,207	32,485	.098	185,257	.563	121,239	.369
11	Washington, D. C..	321,128	112,087	.349	2,697,137	8.403	3,543,064	1.103
12	Los Angeles, Cal. ..	270,491	66,147	.245	1,029,542	3.813	13,721	.051
13	Minneapolis, Minn.	286,241	57,616	.202	210,196	.735	14,380	.050

"From the above table it will be seen that Baltimore, as compared with other cities, secured the smallest amount per capita from licenses and permits, was fifth in the amount per capita received from taxes, seventh in amount received from fines and forfeits, and tenth in amount per capita received from subven-

tions and grants from other civil divisions for education, while nothing was received from subventions and grants for other purposes. Had Baltimore received as much per capita from licenses and permits as the median city, about $318,000 would have been added to its resources in 1908; and had as much been raised per capita from taxes as the median city, about $445,000 would have been added to its available funds for 1908. While it is true, on the other hand, that the subvention received from the State for educational purposes was paid by this city, and still more in addition, as the State school tax, the same may be said of other cities. In fact it seems almost universally true that cities pay more into the State treasuries than they receive back from them, and it is altogether probable that Baltimore fares no worse in this respect than most cities."

That conditions are much the same now as when Professor Elliott made his investigation is indicated by the following tables from Dr. Updegraff's "Expenses of City School Systems" which is based on the latest data available.[1]

TABLE 126

DISTRIBUTION OF RATIOS OF TOTAL SCHOOL EXPENSES TO POPULATION

Ratio	Number of Cities				
	Group I	Group II	Group III	Group IV	Total
1.50 to 1.99	.....	.....	3	.....	3
2.00 to 2.49	.....	.....	2	2	4
2.50 to 2.99	1	3	3	5	12
3.00 to 3.49	1	.....	10	4	15
3.50 to 3.99	2	4	8	6	20
4.00 to 4.49	3	7	6	6	22
4.50 to 4.99	4	3	5	2	14
5.00 to 5.49	.....	2	1	3	6
5.50 to 5.99	.....	1	2	.....	3
6.00 to 6.49	2	.....	2	.....	4

[1] Harlan Updegraff, *A Study of Expenses of City School Systems.* U. S. Bureau of Education, Bulletin, 1912, No. 5.

TABLE 127

DISTRIBUTION OF RATIOS OF SCHOOL EXPENSES TO TOTAL CITY EXPENSES

Ratio	Number of Cities				
	Group I	Group II	Group III	Group IV	Total
.15 to .199	.....	.....	3	1	4
.20 to .249	5	2	2	2	11
.25 to .299	4	2	3	1	10
.30 to .349	2	8	11	7	28
.35 to .399	2	4	6	7	19
.40 to .449	.....	3	10	4	17
.50 to .549	.....	1	7	3	11
.55 to .599	.....	.....	.....	3	3

TABLE 128

DISTRIBUTION OF RATIOS OF SCHOOL EXPENSES TO EXPENSES FOR POLICE

Ratio	Number of Cities				
	Group I	Group II	Group III	Group IV	Total
1.00 to 1.49	3	.....	4	1	8
1.50 to 1.99	3	3	.....	2	8
2.00 to 2.49	2	3	6	2	13
2.50 to 2.99	3	4	6	1	14
3.00 to 3.49	1	5	6	4	16
3.50 to 3.99	.....	1	6	2	9
4.00 to 4.49	1	1	4	3	9
4.50 to 4.99	.....	1	4	3	8
5.00 to 5.49	.....	.....	2	3	5
5.50 to 5.99	.....	.....	1	1	2
6.00 to 6.49	.....	1	1	4	6
6.50 to 6.99	.....	.....	.....	.....	.....
7.00 to 7.49	.....	1	2	.....	3
7.50 to 7.99	.....	.....	.....	1	1
8.00 to 8.49	.....	.....	.....	1	1

§ 24. The Apportionment of School Funds

We are in the habit of claiming that in our country there is equal opportunity for every boy or girl by reason of our great systems of free public education. Often we overlook the fact that communities differ very greatly in the educational opportunity which they offer. When we find a community in which the schools are markedly inferior, we are apt to characterize the place as unprogressive. The largest problem that we face in our state school systems is that of equalizing the educational opportunity offered to the children of the rural community, the village or town, and the city. Along with the shift of population from the country to the city there has come a corresponding concentration of wealth in these larger centers. Many communities are to-day poorer than they were fifty years ago, while on the other hand the per capita of other wealthy places may have increased ten or even fifty fold.

It has long been an accepted principle of taxation that ability to pay is the only adequate measure of the amounts of tax to be paid. The older idea that a man paid for certain benefits he received was essentially non-social and impossible of acceptance in a democratic society. State taxes for the support of public education have become the rule in our American Commonwealths, and yet there is as yet no commonly recognized principle of distribution which adequately equalizes the burden imposed upon the various civil divisions within the states. If men or communities should pay taxes in proportion to their ability to pay, it follows that a uniform state tax must be distributed on some basis other than that upon which the tax is levied in order to equalize the burden of taxation.

No one would to-day deny that education is a state function.

Indeed, if the national government had the power, it might be argued that the only adequate organization and support of education must be nation wide. Boys and girls do not stay where they grow up. Our population is mobile. The education received by A in a New England village community may make for his effective participation in the life of some other community within the state in which he lives, in some large city in New England, or in some remote section of the country. The fact the national government aids schools of agriculture and engineering and the agitation for a national subsidy for the teaching of industrial and household arts is not without significance in indicating possible future development. As the situation stands at present the equalization of opportunity in education as well as the equalization of the burden of taxation in support of schools rests almost wholly with our states. By means of state school taxes distributed in such a way as to equalize the burden which each community must bear, we may hope to secure a degree of equality of opportunity within our states which does not to-day exist.

The only adequate investigation of the apportionment of state school funds is Professor Ellwood P. Cubberley's [1905] "School Funds and Their Apportionment." In the pages which follow are given a few of the tables presented by Professor Cubberley in his most adequate treatment of this subject. The tables are in the main self-explanatory. The line of reasoning advanced will be best understood by presenting first Professor Cubberley's conclusions. The other order would, of course, be preferable were it possible to present here a more detailed abstract of the investigation.

"That of the different single bases used for the apportionment of funds, 'taxes-where-paid' and the property-valuation bases have no educational significance, and do not tend to equalize either the burdens or the advantages of education.

"That the use of total population as a basis of apportionment

while an improvement over 'taxes-where-paid' or property-valuation, is at best only a rough and unreliable method of approximately determining the number of children for whose education provision is to be made.

" That the use of the school census basis for the apportionment of funds, as required by so many state constitutions, and as used in whole or in part by thirty-eight different states, though an improvement over the other apportionment bases so far mentioned, is, nevertheless, one of the worst and most unjust bases of apportionment we have in use, and its complete abandonment in the future for some better single basis or for a combination basis plan is greatly to be desired.

" That total enrollment, enrollment for a definite period, average membership, average daily attendance, and aggregate days' attendance are each successive improvements over the census basis of apportionment, and each places a premium on more efforts which a community ought to be encouraged to make than the one preceding it.

" That all these bases are defective when used alone, because none make any better provision for the needs of the small school than is made under the census basis of apportionment, while aggregate days' attendance, used alone, would leave the small school in even worse financial condition.

" That the real unit of cost is the teacher who must be employed to teach the school, and not the children who may or do attend, and that the teacher actually employed should accordingly occupy a prominent place in any general apportionment plan, the remainder being given on a basis which considers regularity of attendance at the school.

" That more equitable results could be obtained by distributing all funds on the basis of teachers actually employed than on any other single basis and that the general adoption of this basis would be an improvement over the census basis, but that the

best results can only be obtained by a combination of two or more bases, and hence a combination basis type of apportionment is preferable to any single basis type.

" That, where the fund at hand for distribution is large enough to permit of the use of such a plan, the best basis for the distribution of funds is a combination of teacher-actually-employed and aggregate days' attendance (or average daily attendance multiplied by length of term).

" That if this combination basis of apportionment were adopted by many of the states now using the census basis of apportionment, the minimum demands of the states could, in most cases, be substantially increased without increasing the general school tax.

" That it is both just and desirable that the efforts made by communities to provide secondary education and many of the more recent advantages of education, such as kindergartens, manual training, evening schools, etc., should be recognized by the state in making the apportionment of funds, and that an incentive should be given to communities to provide these advantages for their children.

" That even after a distribution has been made on such a combination basis as that mentioned above there still probably would be heavy burdens to be borne by some poorer communities, in which case a certain "reserve fund" should be set aside, to be distributed by some responsible educational body, for the relief of those communities which have made the maximum effort allowed by law and yet are unable to meet the minimum demands of the state, and those whose peculiar circumstances make some additional assistance particularly desirable.

" That the state, in making the apportionment to the counties, ought to use as good an apportionment basis as is used by the counties themselves in making the apportionment to the townships or districts. The use of a good combination basis of appor-

tionment within the counties cannot overcome the inequalities created between the counties when the state apportionment is made on an essentially inferior basis, as for example, census. The best plan would seem to be that the state and county apportionments be made on essentially the same combinations basis, the state apportionment being made to the counties instead of to the townships or districts only that any county funds may first be added before making the township or district apportionment.

" In states having no state school tax and only a relatively small income from the permanent school fund of the state, this income ought to be reserved, in part at least, for use in aiding necessitous communities and as subsidies to encourage the introduction of new and desirable advantages, and it should not be distributed indiscriminately to all.

" That the present plans in use for the apportionment of school funds in fully three-fourths of the states of the Union are in need of careful revision, and that there is likewise need for a more careful study of this problem than has been given it so far by most of the states if it is desired that future evolution shall take place along more intelligent lines than has been the case in the past."

The tables which follow show clearly the inequalities due to the methods of distribution commonly used. One does not need to argue at length in favor of the plan suggested by Professor Cubberley of distributing on the per teacher actually employed and aggregate days attended bases. Teachers' salaries represent from sixty to eighty per cent of the school budget. Encouragement should certainly be given to those communities which keep children in school.

TABLE 129

AVERAGE VALUATION OF MASSACHUSETTS COUNTIES, PER CENSUS CHILD 5–15 YEARS OF AGE, WITH THE RATE OF INCREASE OR DECREASE [1]

County	Census, 5–15 Years		Av. Valuation per Census Child		Rate of change	
	1871	1901	1871	1901	In Census	In Wealth per Child
Barnstable	6,669	4,199	$2,075	$5,956	−37%	+186%
Berkshire	13,085	17,661	2,961	3,489	+35%	+18%
Bristol	19,979	45,971	4,317	4,173	+129%	−03%
Dukes	762	584	3,060	7,363	−22%	+140%
Essex	38,639	59,261	3,650	4,651	+53%	+29%
Franklin	6,068	7,187	2,445	3,222	+18%	+32%
Hampden	13,787	32,121	4,015	4,707	+135%	+17%
Hampshire	8,665	10,312	2,943	3,294	+19%	+12%
Middlesex	52,211	96,305	4,818	5,486	+84%	+13%
Nantucket	665	391	2,782	8,685	−70%	+215%
Norfolk	18,045	26,479	4,642	7,974	+47%	+72%
Plymouth	12,846	18,619	2,394	4,453	+45%	+86%
Suffolk	49,722	103,062	12,624	11,584	+107%	−09%
Worcester	37,116	60,959	3,284	4,068	+64%	+24%
The State	278,249	483,103	5,381	6,279	+73%	+16%

[1] *35th An. Rept. Bd. Educ., Mass.*, for the year 1871, pp. 117–132, with statistical tables, pp. 154–172.
66th An. Rept. Bd. Educ., Mass., for 1901–2.

TABLE 130

RATE OF TAX LEVIED AND AMOUNT PRODUCED, WITH RELATIVE RANK, OF TWENTY-ONE MASSACHUSETTS TOWNS AND CITIES, 1901–02

(Data selected from Graduated Tables I and II in *66th An. Rept. Bd. Educ., Mass.* 1901–02, in "Abstract of School Returns" for the year)

City or Town[1]	Rank in Amount Levied	Rate of Local Tax Levied	Amt. Produced per Pupil in Av. Memb. in School	Rank in Amount Produced
Seven levying highest rate—				
West Boylston	1	9.20 mills	$22.33	131
Warren	2	8.79 "	19.17	216
East Longmeadow	3	8.56 "	14.17	303
Huntington	4	8.50 "	15.88	277
Groveland	5	8.29 "	18.92	221
Dighton	6	8.18 "	24.11	95
Abington	7	7.94 "	25.44	75
Seven largest cities—				
Boston	333	2.39 "	33.86	15
Worcester	192	4.61 "	28.45	40
Fall River	260	3.89 "	22.03	137
Lowell	194	4.58 "	30.73	21
Cambridge	219	4.33 "	29.51	28
Lynn	196	4.56 "	28.65	38
New Bedford	287	3.46 "	26.99	42
Seven levying lowest rate—				
Brookline	346	1.91 "	51.68	3
Hull	347	1.73 "	45.75	7
Tolland	348	1.61 "	4.00	350
Goshen	349	1.50 "	4.43	351
Manchester	350	1.37 "	33.72	16
Chilmark	351	1.31 "	9.37	343
Nahant	352	1.10 "	52.10	2
Gosnold	353	.85 "	10.53	336

[1] The poorer towns received state aid in addition, which the cities did not.

TABLE 131

AN ANALYSIS OF THE RETURNS FOR FAIRFIELD COUNTY, CONNECTICUT, FOR THE SCHOOL YEAR 1901–02

(Calculated from data given in the *Rept. Conn. Bd. Educ.* for 1903, statistical tables, pp. 260, 261, 274, and 283)

Towns	Total Valuation	Census 4-16 Yrs. Oct., 1901	Valuation per Child	No. of Schools (Depts.)
Bridgeport	$61,560,175	17,369	$3,544	219
Danbury	7,978,801	4,641	1,764	67
Bethel	1,189,543	715	1,663	18
Brookfield	431,200	196	2,200	8
Darien	2,606,241	443	5,883	11
Easton	489,310	189	2,588	9
Fairfield	3,360,460	953	3,526	17
Greenwich	8,758,830	2,662	3,294	50
Huntington	4,112,611	1,332	3,086	26
Monroe	357,500	194	1,843	7
New Canaan	1,939,190	594	3,265	17
New Fairfield	341,064	128	2,664	6
Newton	1,565,763	565	2,771	22
Norwalk	12,840,031	4,632	2,984	71
Redding	375,274	217	2,651	8
Ridgefield	1,879,961	549	3,424	17
Sherman	324,802	128	2,539	6
Stamford	10,531,321	4,567	2,306	92
Stratford	1,437,031	904	1,589	17
Trumbull	642,293	322	1,995	8
Weston	298,184	155	1,924	5
Westport	2,319,055	853	2,719	14
Wilton	870,014	374	2,324	11
The County	$127,408,654	42,682	$2,985	726

TABLE 131 (*Continued*)

Towns	Av. Valuation Per School (Dept.)	Rate of Tax in Mills for $250	Rate of Local Tax Levied 1901-02	Cost per Pupil in Av. Dy. Att. for Maint.
Bridgeport	$281,097	.88 mills	3.26 mills	$28.06
Danbury	119,088	2.10 "	4.40 "	24.55
Bethel	66,085	3.79 "	7.16 "	18.70
Brookfield	53,900	4.64 "	4.55 "	20.25
Darien	236,840	1.05 "	2.45 "	33.79
Easton	54,364	4.60 "	4.43 "	21.07
Fairfield	197,674	1.26 "	3.19 "	29.09
Greenwich	175,177	1.43 "	2.43 "	24.50
Huntington	158,177	1.68 "	3.20 "	19.91
Monroe	51,071	4.90 "	4.25 "	17.01
New Canaan	113,481	2.20 "	4.29 "	26.22
New Fairfield	56,844	4.40 "	3.89 "	22.89
Newton	71,171	3.51 "	3.97 "	24.39
Norwalk	194,930	1.28 "	2.93 "	22.26
Redding	71,909	3.48 "	2.96 "	20.18
Ridgefield	110,586	2.26 "	2.89 "	20.95
Sherman	54,134	4.61 "	3.47 "	19.21
Stamford	144,471	1.73 "	6.78 "	30.40
Stratford	84,531	2.96 "	6.76 "	21.84
Trumbull	80,287	3.13 "	5.19 "	25.86
Weston	58,037	4.33 "	3.07 "	19.59
Westport	165,646	1.51 "	1.85 "	14.96
Wilton	78,183	3.19 "	2.79 "	15.87
The County	$175,494	1.42 "		$23.18

TABLE 132

ILLUSTRATING INEQUALITIES EXISTING IN THE STATE OF MISSOURI

(Calculated for the school year 1903–04 from statistical data given in the *Rept. State Supt. of Pub. Instr. of Mo.*, 1904)

Counties	Total Valuation	Census 4-20 Years	Av. Val. per Census Child	No. Trs. Employed	Av. Val. per Tr. Employed	Tax in Mills for $250 per Tr.
Adair	$5,500,000	6,800	$809	151	$36,423	6.86
Andrew	7,572,928	5,020	1,508	108	70,119	3.56
Atchison[1]	8,389,345	4,775	1,757	126	66,582	3.75
Audrain	8,752,360	7,549	1,336	146	59,263	4.22
Barry	4,515,310	8,368	539	137	32,958	7.58
Barton	5,998,313	5,817	1,031	141	42,540	5.87
Bates	10,169,171	8,907	1,142	173	58,781	4.25
Benton	4,291,470	5,437	789	109	39,371	6.34
St. Louis, City	415,824,520	178,260	2,331	1,859	223,682	1.11
The State	$1,284,294,571	995,536	$1,290	17,036	$75,387	3.32

[1] Due to an evident typographical error in the Report for 1904, the figures for this county were taken from the Report for 1903.

TABLE 133

ILLUSTRATING INEQUALITIES EXISTING IN THE STATE OF CALIFORNIA

(Calculated for the school year 1903–04 from data given in the statistical tables of the *21st Bien. Rept. Supt. Pub. Instr., Cal.*, 1903–04)

Counties	Total Valuation	Census 5–17 Years	Av. Val. per Census Child	No. Trs. Employed	Av. Val. per Tr. Employed	Tax in Mills for $250 per Tr.
Alameda	$128,681,766	34,939	$3,362	575	$223,620	1.12
Alpine	422,063	78	5,411	3	140,688	1.77
Amador	4,918,908	2,389	2,059	63	78,236	3.18
Butte	16,057,766	4,677	3,433	108	148,683	1.68
Calaveras	6,177,275	2,631	2,348	73	84,620	2.96
Colusa	12,188,096	1,858	6,559	53	229,964	1.08
Contra Costa	21,753,956	4,897	4,442	98	221,979	1.13
Del Norte	2,882,445	678	4,251	18	160,136	1.56
San Francisco	564,070,301	97,353	5,794	996	566,336	.44
The State	$1,598,603,226	407,398	$3,923	7,797	$205,028	1.22

TABLE 134

HIGHEST AND LOWEST RATE OF TAX IN MILLS NECESSARY TO PRODUCE $250 BY LOCAL TAXATION, WITH STATE AVERAGES

(Compiled from the preceding tables)

Table Number	Item	Rate of Taxation in Mills		
		Highest	Lowest	Average
2	37 Massachusetts towns	11.62	.36	
6	8 Connecticut counties	2.97	1.42	
	State of Connecticut			1.75
7	15 towns of Windham Co.	8.41	1.35	2.68
8	23 towns of Fairfield Co.	4.90	.88	1.42
10	9 Wisconsin counties	11.57	.72	
	State of Wisconsin			1.95
11	8 Missouri counties	7.58	3.56	
	State of Missouri	....		3.32
12	8 Kansas counties	10.88	3.90	
13	9 California counties	3.18	.44	
	State of California			1.22
14	10 Indiana counties	10.41	1.76	
	State of Indiana			2.99

TABLE 135

SUMMARY OF STATISTICAL TABLES SHOWING WEALTH, TAX RATE, AND COST OF SCHOOL BY COUNTIES [1]

	Massachusetts	Washington	New York	Indiana
Per Capita Wealth—				
Lowest	$535.00	$44.00	$328.00	$222.00
Highest	1,982.00	2,436.00	1,507.00	1,375.00
Medium	700.00	640.00	682.00	576.50
Local Rate, per $100 of taxables—				
Lowest	.33	.13	.21	.15
Highest	.88	1.19	.83	1.11
Medium	.395	.53	.395	.63
Annual Per Capita Cost per Pupil Enrolled—				
Lowest	$19.00	$11.00	$16.00	$11.00
Highest	46.50	45.00	73.00	42.00
Medium	31.90	20.00	26.50	21.50

For the state of New York, a state in which total population is used as a partial basis for the apportionment of state funds, similar calculations from the returns of the School Commissioners for the first fifteen counties, as arranged in alphabetical order, cities omitted, give the results [2] shown in Table 136.

[1] Charles S. Meek, *State and Local Taxation for Public Schools*. Teachers College Record, Vol. XI, No. 5. All of the other tables are from Professor Cubberley's study.

[2] Calculated from data given in tables 3 and 4 of the *Rept. Supt. Pub. Instr. of New York*, 1902, Vol. II. The calculations are based on the National Census of 1900, the biennial state school census of 1901, and the number of teachers employed for the school year 1900–1901.

TABLE 136

THE RELATION OF THE NUMBER OF CHILDREN AND OF TEACHERS TO THE WHOLE POPULATION

County	Children of Census Age	Teachers Employed per 1,000 Inhabs.	County	Children of Census Age	Teachers Employed per 1,000 Inhabs.
Albany	20.1%	5.4	Clinton	27.5%	7.2
Allegany	21.5%	10.5	Columbia	18.8%	6.2
Broome	20.4%	10.9	Cortland	19.0%	10.5
Cattaraugus	19.7%	7.9	Delaware	20.3%	9.6
Cayuga	19.2%	8.9	Dutchess	18.2%	5.0
Chatauqua	21.4%	9.5	Erie	25.0%	5.9
Chemung	21.5%	10.0	Essex	23.0%	9.7
Chenango	19.0%	9.9			

TABLE 137

PERCENTAGE ENROLLED AND THE VALUE OF THE STATE APPORTIONMENT ON ENROLLMENT FOR CERTAIN WISCONSIN COUNTIES

(Calculated on the basis of the census of the summer of 1903 and the enrollment for the school year 1903–04, from statistical data given in the *Rept. Supt. Pub. Instr., Wis.*, for 1903–04)

Counties, Including Cities Under a City Superintendent	Percentage of Census, 4–20 Years Enrolled	Value of $1.82½ Census Apportionment on Actual Enrollment
Adams	77%	$2.37
Ashland*	65%	2.81
Barron	74%	2.46
Bayfield	74%	2.46
Brown†	51%	3.58
Buffalo	67%	2.73
Burnett	70%	2.61
Calumet	50%	3.65
Milwaukee‡	43%	4.24
* City of Ashland, alone	61%	2.99
† City of Green Bay, alone	56%	3.26
‡ City of Milwaukee, alone	41%	4.45
State of Wisconsin, average	61%	2.69
State, cities omitted	65%	2.81
Cities alone	52%	3.51

TABLE 138

WHAT $1.00 OF CENSUS APPORTIONMENT IS WORTH ON TOTAL ENROLLMENT

Counties, in Alphabetical Order, and Cities	Wis.	Kan.	Mo.	Cal.	Ind.
1st	$1.30	$1.49	$1.25	$1.43	$1.45
2d	1.54	2.22	.97	1.28	2.08
3d	1.35	1.16	1.05	1.28	1.35
4th	1.35	1.54	1.28	1.17	1.20
5th	1.96	2.08	1.00	1.32	1.26
6th	1.49	1.19	1.07	1.20	1.22
7th	1.43	1.11	1.11	1.15	1.32
8th	2.00	1.16	1.29	1.28	1.25
Largest city	2.44	1.73	2.08	1.56	1.47
Second largest city	1.89	1.59	2.17	[1]	2.17
Third largest city	1.92	1.52	3.59	[1]	2.38

TABLE 139

SHOWING WHAT SMALL COUNTRY SCHOOLS OF CERTAIN SIZES IN WISCONSIN WOULD RECEIVE UNDER CERTAIN PLANS OF APPORTIONMENT, BASING CALCULATIONS ON TOTAL APPORTIONMENT, CENSUS, ENROLLMENT, AND ESTIMATED AVERAGE DAILY ATTENDANCE

(Calculated for 1903–04 from statistical data given in the *Rept. Supt. Pub. Instr., Wis.*, 1903–04. See similar preceding tables. The different apportionment values are calculated on the state averages, but the percentages used in the table are those for town and country schools only)

Census, 4–20 Years	Enrollment at State Average without Cities, of 65%	Amount of State Aid Apportioned on			
		Census, 4–20 Years of Age, at $1.82½	Total Enrollment at $2.99	Forty-day Enrollment with 20% loss, at $3.52	Av. Dy. Att. at 70% of Enrollment, and at $4.15
11	7	$20.08	$20.93	$21.12	$20.75
16	10+	29.20	29.90	28.16	29.05
23	15	41.98	44.85	42.24	41.50
31	20+	56.38	59.80	56.32	58.10
39	25+	71.18	74.75	70.40	70.55
46	30	83.95	89.70	84.48	87.15
62	40+	113.15	119.60	112.64	116.20
77	50	140.53	149.50	140.80	145.25
92	60—	167.90	179.40	168.96	174.30
108	70+	197.10	209.30	197.12	203.35
123	80	224.48	239.20	224.38	232.40
137	89	250.03	266.11	249.92	257.30

[1] Data for calculation lacking.

TABLE 140

APPORTIONMENTS OF FOUR SCHOOLS COMPARED ON THE CENSUS, TOTAL ENROLLMENT, FORTY-DAY ENROLLMENT, AND AVERAGE DAILY ATTENDANCE BASES

	State No. 1		State No. 2	
	Per Cent	Number	Per Cent	Number
Total school census of each district	100%	40	100%	40
Per cent of census enrolled	75%	30	80%	32
Loss on a forty-day enrollment	15%	25.5	19%	25.9
Av. Dy. Att. on enrollment—				
The general state average	60%	18	75%	24
Averages of Districts A and B	70%	21	85%	27.2
Averages of Districts C and D	50%	15	65%	20.8

On a basis of a per-capita on census apportionment of $1.00 this gives the following per-capita values for the state apportionment in each state:

TABLE 141

	State No. 1	State No. 2
Apportionment on census	$1.00	$1.00
Apportionment on total enrollment	1.333+	1.25
Apportionment on forty-day enrollment	1.569+	1.543+
Apportionment on average daily attendance	2.222+	1.666+

Using the above values for calculation we get the following for a school of forty census children, calculated on the state averages:

	On Census	On Total Enrollment	On Forty-day Enrollment	On Av. Dy. Att.
State No. 1	$40.00	$40.00	$40.00	$40.00
State No. 2	40.00	40.00	40.00	40.00

This is only a natural result. There being only so much money to be distributed, a school, whatever its size, will always get the same amount of money on any basis of distribution, so long as the

average for the school is the same as the average for the state. It is only when the school varies from the state average that it gains or loses. This may be shown by making similar calculations for the four schools, A, B, C, and D, which varied from the state averages in average daily attendance, as given above. Doing this, we get the following result:

District	On Census	On Enrollment	On Average Daily Attendance	
			State No. 1	State No. 2
A	$40.00	$40.00	$46.66	
B	40.00	40.00		$45.33
C	40.00	40.00	33.33	
D	40.00	40.00		34.66

TABLE 142

INCOME OF A CITY SCHOOL AND A SMALL COUNTRY SCHOOL COMPARED UNDER THE CENSUS, AVERAGE DAILY ATTENDANCE, AND AGGREGATE DAYS' ATTENDANCE BASES

School	Census	Enrollment	Av. Dy. Att.	Term
Country	29	20	14.5	127 days
City	73	50	36.5	200 "

School	Census at $2.90	Value of State Apportionment on	
		Av. Dy. Att. at $5.36	Av. Dy. Att. × Term at 3½c. per Pupil per Day
Country	$84.10	$77.72	14.5×127×.03½=$64.45
City	211.70	195.64	36.5×200×.03½=256.30

TABLE 143

EFFECT OF AN APPORTIONMENT ON CENSUS AND ON TEACHERS COMPARED FOR CERTAIN WISCONSIN COUNTIES

County	Tax in Mills to Raise $250 per Teacher	Av. Value of State Apport. per Teacher Employed	Tax in Mills for Balance of $250 per Teacher	Value of State Apport. on Teacher Basis	Tax in Mills for Balance of $250 per Teacher
Adams	6.75	$46.40	5.50	$103.36	3.96
Ashland	3.14	96.44	1.93	103.36	1.90
Barron	5.83	84.61	3.84	103.36	3.41
Bayfield	2.03	84.55	1.34	103.36	1.18
Brown	1.56	176.69	.46	103.36	.86
Buffalo	3.04	87.58	1.97	103.36	1.74
Burnett	11.57	60.37	8.78	103.36	6.07
Calumet	1.44	134.38	.66	103.36	.84
Milwaukee	.72	193.29	.17	103.36	.42 [1]

TABLE 144

EFFECT OF AN APPORTIONMENT ON CENSUS AND ON TEACHERS COMPARED FOR CERTAIN MISSOURI COUNTIES

Counties	Tax in Mills to Raise $250	Av. Value State Apport. per Teacher Employed	Tax in Mills for Balance of $250	Value of State Apport. on Teacher Basis	Tax in Mills for Balance of $250
Adair	6.86	$ 58.14	5.27	75.44	5.07
Andrew	3.56	60.00	2.70	75.44	2.49
Atchison	3.75	47.00	3.05	75.44	2.62
Audrain	4.22	57.91	3.24	75.44	2.93
Barry	7.58	78.85	5.20	75.44	5.29
Barton	5.87	53.26	4.60	75.44	4.11
Bates	4.25	66.46	3.12	75.44	2.97
Benton	6.34	64.39	4.70	75.44	4.43
St. Louis (City)	1.11	123.79	.56	75.44	.78 [2]

[1] To produce the balance of $500 instead of $250 per teacher employed, this rate would be only 1.85 mills; and to produce the balance of $800 per teacher, the rate would be but 3.24 mills.

[2] To produce the balance of $500 instead of $250 per teacher employed, this rate would be only 1.15 mills, and to produce the balance of $750 per teacher, the rate would be but 1.87 mills.

It is interesting to note that since Professor Cubberley's investigation was published several states have undertaken to revise the basis for apportioning their school moneys. In two of them at least, to the writer's personal knowledge, Dr. Cubberley's book was continually consulted by the legislative committee which prepared the bill embodying the new basis of apportionment.

The plan not uncommonly found of giving special aid for the newer types of educational endeavor is to-day receiving wide recognition in the special subsidies which are being granted for industrial schools. Doubtless it will always be necessary to reserve a part of the state money for the encouragement of those educational experiments which need not simply state aid but also the stamp of approval thus given.

Along with the provision made through the equitable distribution of school funds for equality of educational opportunity and of the burden sustained in supporting education, there should be developed a system of fines or penalties, enforced by withholding state funds, which will operate to secure the enforcement of the educational laws of the state. A community which fails to enforce the compulsory education law, which violates the regulations with respect to proper school accommodations, which hires a teacher whose training is less than that required by law, or which in any other way falls below the minimum standard established by the state can be made to recognize the importance of compliance with state regulations without difficulty when the state money is withheld wholly or in part. Unless some such penalty is attached the least progressive communities, the one for which the minimum standards of efficiency are made, will have little respect for the laws enacted for the benefit of the children of the state.

BIBLIOGRAPHY OF REFERENCES IN THE TEXT

AYRES, L. P. 1909 Laggards in Our Schools.

BLAN, L. B. 1911 A Special Study of the Incidence of Retardation. *Teachers College, Columbia University, Contributions to Education*, No. 40.

BONSER, F. G. 1910 The Reasoning Ability of Children of the Fourth, Fifth, and Sixth School Grades. *Teachers College, Columbia University, Contributions to Education*, No. 37.

BRYAN, J. E. 1907 A Method for Determining the Extent and Causes of Retardation in a City School System. *Psychological Clinic*, vol. 1, pp. 41–52.

COFFMAN, L. D. 1911 The Social Composition of the Teaching Population. *Teachers College, Columbia University, Contributions to Education*, No. 41.

CORNMAN, O. P. 1908 The Retardation of the Pupils of Five City School Systems. *Psychological Clinic*, vol. 1, pp. 245–257.

CUBBERLEY, E. P. 1905 School Funds and Their Apportionment. *Teachers College, Columbia University, Contributions to Education*, No. 2.

EARHART, L. B. 1908 Systematic Study in the Elementary School. *Teachers College, Columbia University, Contributions to Education*, No. 18.

ELLIOTT, E. C. 1905 Some Fiscal Aspects of Education. *Teachers College, Columbia University, Contributions to Education*, No. 6.

HILLEGAS, M. B. 1912 A Scale for the Measurement of Quality in English Composition by Young People. *Teachers College Record*, Vol. XIII, No. 4.

JESSUP, W. A. 1911 Social Factors Affecting Special Supervision. *Teachers College, Columbia University, Contributions to Education*, No. 43.

KEYES, C. H. 1911 Progress Through the Grades of City Schools. *Teachers College, Columbia University, Contributions to Education*, No. 42.

MEEK, C. S.	1910	State and Local Taxation for Public Schools. *Teachers College Record*, Vol. XI., No. 5.
MERIAM, J. L.	1905	Normal School Education and Efficiency in Teaching. *Teachers College, Columbia University, Contributions to Education*, No. 1.
PAYNE, B. R.	1905	Elementary School Curricula. Report of the Commission Appointed to Study the System of Education in the Public Schools of Baltimore. *U. S. Bureau of Education Bulletin*, No. 4, 1911.
STONE, C. W.	1908	Arithmetical Abilities and Some of the Factors Determining Them. *Teachers College, Columbia University, Contributions to Education*, No. 19.
STRAYER, G. D.	1905	City School Expenditures. *Teachers College, Columbia University, Contributions to Education*, No. 5.
THORNDIKE, E. L.	1908	The Elimination of Pupils from School. *Bulletin*, No. 4, 1907, Whole Number 379, ol the *U. S. Bureau of Education.*
THORNDIKE, E. L.	1909	The Teaching Staff of Secondary Schools in the United States: Amount of Education, Length of Experience, Salaries. *Bul'etin*, 1909, No. 4, Whole Number 404, of the *U. S. Bureau of Education*,
UPDEGRAFF, H.	1912	A Study of the Expenses of City School Systems.
VAN DENBURG, J. K.	1911	Causes of the Elimination of Students in Public Secondary Schools of New York City. *Teachers College, Columbia University, Contributions to Education*, No. 47.

INDEX

Abilities in arithmetic in relation to environment, 240

Ability in entrance examinations related to ability in each year of college work, 177, 184 ff.

Ability, in relation to elimination, 50 ff., 53

Acceleration, causes of, 41 ff.

Age-grade table, 260

Age-grade tables, significance of, 3 ff.

Age, in relation to grade of pupils, 3 ff.; of leaving school, 5, 8, 12 f., 15 ff.; of entrance to school, 41; of entrance to high school, 48, 51 f.; of teachers at entrance to teaching, 104

Apportionment of school funds, 368 ff.

Arithmetical abilities and some of the factors determining them, 233 ff.; preliminary tests, 233 ff.; what the scores measure, 235; scores for twenty-six school systems, 236 ff.; ratio of time expended to abilities, 238

Assigning lessons, method of, 244

Attendance, form for reporting, 261; in relation to retardation, 41 f.

Ayres, L. P., 5, 28, 35

Baltimore, enrollment statistics of, 16 f.

Baltimore, report of commission appointed to study the system of education in public schools of, quoted, 160 ff., 365 ff.

Blan, L. B., 37 ff.

Bonser, F. G., 54 ff.

Boston, enrollment statistics of, 16 f.

Bowdoin, individual courses of study at, 190; specialization and "scattering" at, 201 f.

Brooklyn. *See* New York City.

Bryan, J. E., 5

Budget, city school, 324 ff.

Business manager in city school systems, 270

Chester, promotion in, 29

Chicago, enrollment statistics of, 17; promotion in, 28, 29

Cleveland, enrollment statistics of, 16 f., 18, 23 f.

Coefficients of correlation, tables of, 328 ff.

Coffman, L. D., 94 ff.

College, examinations for entrance to, 176 ff.

Columbia, individual courses of study at, 191; specialization and "scattering" at, 201 f.

Columbus (Ohio), enrollment statistics of, 17; promotion in, 29

Committee of Ten, report of, 165 f.

Connecticut, age-grade table for, 4, 15; elimination of pupils in, 22

Cornell, individual courses of study at, 192; specialization and "scattering" at, 201 f.

Cornman, O. P., 5

Correlation, coefficients of, 328 ff.

Course of study, and promotion, 30 f., 44; in rural high schools, 166 ff.; for the A. B. degree, 188 ff.

Cubberley, E. P., 369 ff.
Cumulative record card, 252 ff.
Curriculum, the elementary school, 149 ff.; effect of public opinion upon, 150; overcrowded, 151; and longer school day, 150; percentages of total time given to each subject, 152; time in minutes for each subject, 152; percentage of recitation time given to each subject, 153; time-table, New York City schools, 1888, 1904, 154; time-table, St. Louis schools, 1888, 1904, 155; time devoted to each subject in English cities, 156 ff.; time devoted to each subject in German cities, 158 ff.; time devoted to old subjects and to new subjects, 160; time devoted to arithmetic and algebra in American cities, 161; place in course where certain topics in arithmetic are taught, 162; time devoted to manual training, 163; measuring results, 163

Dayton, enrollment statistics of, 17, 18
Defects, of vision, in relation to retardation, 41; in relation to elimination, 48, 42.
Degree of A. B., studies actually taken for, 188 ff.
Denver, enrollment statistics of, 17, 23 f.
Deportment, and retardation, 41
Distribution, of pupils, by age and grade, 3 ff.

Earhart, Lida B., 242 ff.
East Orange, promotion in, 37 ff.
Economic factors, in elimination, 50, 53
Economic status, of pupils, 67 ff.; of teachers, 100 ff.
Education, of teachers, length of, 122 ff., in relation to salary, 87 ff., 93 ff., 97 ff.
Efficiency in teaching, 77 ff.; in relation to ability shown in normal school, 78 ff.; in relation to length of experience, 79 ff.
Election of studies in American colleges, 188 ff.
Elgin, promotion in, 29
Elimination of pupils from school, 5, 8, 9 ff.; as measured by individual life-histories, 9; as inferred from registration statistics, 10 f.; in relation to age, 12 f., 15 ff.; in relation to grade, 13 ff.; estimated from enrollment by age, 19 ff.; and growth of population, 19 f.; and migration to and from cities, 20 f.; in relation to promotion and retardation, 26 ff., 32 ff.; causes of, 46 ff.
Eliot, C. W., 179, 267 ff.
Elizabeth, promotion in, 37 ff.
Elliott, E. C., quoted, 354 ff.
English composition, scale for quality of, 229 ff.
Enrollment, in relation to age and grade, 3 ff.; in relation to estimates of elimination, 10 f., 16 ff.; of high schools, in relation to the sex-balance of the teaching staff, 132 ff.; of public high schools, 165 ff.
Entrance examinations, 176 ff.
Entrance to school, age of, 41, 44
Environment and ability in arithmetic, 240
Examinations for entrance to college, 176 ff.
Expectation, of completing high school course, in relation to elimination, 50, 52 f.
Expenditures, city school, 267; classification of, 273 ff.; basis for comparing, 277; variability, 278 ff.; relationships, 325 ff.; cost per pupil for each item of expense, 279 ff.
Expenditures, for schools and for other

municipal activities, 352 ff.; variability, 354 ff.; relationships, 361 ff.
Experience in teaching, length of, 124 ff.; in relation to efficiency in teaching, 79 ff.; in relation to salary, 82 ff., 95 f.

Family, size of, in case of American teachers, 102
Feminization of education, 145
Financial reports, uniform, 271
Fiscal statistics, form for reporting, 255 ff.
Fitchburg, enrollment statistics of, 17
Flexibility, of courses of study, in large high schools, 173
Foreign parentage, in relation to retardation, 41; in relation to elimination, 49

Galesburg, promotion in, 35
Grades, in relation to age of pupils, 3 ff.; inequality of, in length, 26 ff., 37 ff.; relation of reasoning ability to, 65 ff.
Graduates of high schools, sex-balance of, 137 ff.
Grand Rapids, enrollment statistics of, 17, 23 f.

Handwriting, scales for quality of, 208 ff.
Hartford, retardation and acceleration in, 41 ff.
Harvard, individual courses of study at, 193; specialization and "scattering" at, 201 f.
Headaches, in relation to elimination, 48
Heredity, and retardation, 43 f.
HILLEGAS, M. B., 229

Illness, in relation to elimination, 48
Income of parents of teachers, 102 ff.
Industry, in relation to elimination, 50 f.
Inequality, of grades, in length, 26 ff., 37 ff.

Jamestown, promotion in, 29
Jersey City, enrollment statistics of, 17, 23 f.
JESSUP, W. A., 108 ff., 149 ff.
Johnstown, enrollment statistics of, 17
JUDD, C. H., 188

Kansas City (Kans.), enrollment statistics of, 17
Kansas City (Mo.), enrollment statistics of, 17; promotion in, 28, 29
KEPPEL, F. P., 188
KEYES, C. H., 41 ff.

Little Rock, enrollment statistics of, 17
Los Angeles, enrollment statistics of, 17
Louisville, enrollment statistics of, 17

Manhattan. *See* New York
Measurement of educational products, 207 ff.
MEEK, C. S., 378
MERIAM, J. L., 77 ff.
Minneapolis, enrollment statistics of, 17, 18
Municipal expenditures, school and other, 352 ff.; variability, 354 ff.; relationships, 361 ff.

Nativity, of teachers, 101
Newark, enrollment statistics of, 17, 23 f.
New Orleans, enrollment statistics of, 17
New York City, promotion in, 29, 37 ff.; elimination in, 46 ff.; social and economic status of high school pupils in, 69 ff.
Normal school education, and efficiency in teaching, 77 ff.

Occupation, choice of, in relation to elimination, 49, 52; in relation to studies taken for the A. B. degree, 190 ff.
Occupations, of parents of high-school pupils, 69 f.; of teachers, 101 f.
Omaha, enrollment statistics of, 17

Pasadena, promotion in, 29
Paterson, promotion in, 37 ff.
PAYNE, B. R., 152 ff.
Plainfield, promotion in, 37 ff.
Princeton, individual courses of study at, 194; specialization and "scattering" at, 201 f.
Private schools, and elimination, 11
Promotion, 26 ff.; statistics of, 28 f., 37 ff.; and the course of study, 30 f.; and retardation, 31 f.; flexibility in, 32; and elimination, 32 ff.; of the same student in different grades, 37 ff.; causes of, 41 ff.; and ability, 67 f.
Pupil record-card, 252 ff.

Race, of teachers, 101.
Reasoning, ability of children in, 54 ff.
Record-card, pupil cumulative, 252 ff.
Records and reports, in relation to efficiency, 250
Relationships, among various items of municipal expenditure, 361 ff.; among various school expenditures, 325 ff.
Relationship between salaries of janitors and salaries of teachers, 314
Rental, family, in relation to elimination, 50, 53; of high-school pupils' families, 71 ff.
Reports, school records and, 250; partial, 262; in cycles, 262; uniformity in, 263
Retardation, 5, 8, 26 ff.; and promotion, 31 f.; incidence of, 37 ff.; statistics of; causes of, 41 ff. *See* Promotion.
Retention of pupils in school. *See* Elimination
Revenue, sources of city, 365
Rochester, promotion in, 28, 29
Rural high schools, 166 ff.

Salaries of teachers, 83 ff., 120 ff., 341, 346 ff.; in relation to length of education and length of experience, 83 ff.; in public and private schools, 129 ff.; form for reporting, 259; compared with wages of artisans, 341; in high schools and elementary schools, 346 ff.
San Francisco, promotion in, 29
Scales for measuring educational products, 207 ff.
Scholarship, in relation to elimination, 8, 51, 53; in relation to efficiency in teaching, 78 f.
School expenditures, city, 267; in relation to other municipal expenditures, 352 ff.
School funds, apportionment of, 368 ff.
School records and reports, 250
Secondary schools, elimination in, 46 ff.; salaries of teachers in, 83 ff.; statistics of teachers in, 111 ff.; sex-balance of teachers and pupils in, 132 ff.; size of, 165 ff.
Sex, and elimination, 48, 51; and teachers' salaries, 89 ff., 95 ff., 120 ff., 127 ff.; and career as a teacher, 105 f.; of teachers in relation to the sex-balance of the enrollment in public high schools, 132 ff.
Size of school, as a factor in secondary education, 165 ff.; in relation to the community's support of education, 171 ff.
Social status, of pupils, 69 ff.; of teachers, 100 ff.

Special supervisors, 107
Springfield (Ill.), promotion in, 35
Springfield (Mass.), enrollment statistics of, 10, 17, 18, 23 f.
St. Joseph, enrollment statistics of, 17
St. Paul, enrollment statistics of, 17
Stanford, individual courses of study at, 195; specialization and "scattering" at, 201 f.
Stockton, promotion in, 29
STONE, C. W., 233 ff.
STRAYER, G. D., 267 ff.
Students. *See* Table of Contents. *See* also Age, Grade, Elimination, Retardation, Promotion, etc.
Study, teaching children how to, 245 ff.
Supervision, division of responsibility, 110; salaries of supervisors, 111
Supervision of special subjects, 107; frequency of, 108; distribution by sex, 109

Teachers. *See* Table of Contents. *See* also Education, Experience, Sex, Salary, etc.
Tests of ability in reasoning, 55 ff.
THORNDIKE, E. L., 5, 9, 23, 26, 78, 82, 89, 132, 165, 176
Time devoted to arithmetic in relation to result secured, 238
Toledo, enrollment statistics of, 17
Transfer from school to school, in relation to retardation, 41, 43
Trenton, promotion in, 29
Troy, enrollment statistics of, 17

Unreliability, calculations of, 18 f.
UPDEGRAFF, H. 297 ff., 303 ff., 366 ff.
Utica, promotion in, 29

VAN DENBURG, J. K., 46 ff., 70 ff.
Variability, of pupils of the same grade, in age, 5 f.; of cities with respect to elimination by age, 22 ff.; of pupils in reasoning ability, 54 ff.; of salary for teachers of the same sex, length of education and length of experience, 94; of size of public high schools, 165 ff.; of marks of the same individual in the same subject in entrance examinations, 178; of city school expenditures, 278 ff.; measures of, 313; of municipal expenditures, 354 ff.

Wealth, in relation to elimination, 50, 53
Wellesley, individual courses of study at, 196; specialization and "scattering" at, 201 f.
Wesleyan, individual courses of study at, 197; specialization and "scattering" at, 201 f.
Wheeling, promotion in, 29
Williams, individual courses of study at, 198; specialization and "scattering" at, 201 f.
Williamsport, promotion in, 35
Work, methods of, 241; teachers' knowledge of methods of, 242 ff.

Yale, individual courses of study at, 199 f.; specialization and "scattering" at, 201 f.

THE following pages contain advertisements of books by the same authors or on kindred subjects

Education: A First Book

By E. L. THORNDIKE, Professor of Educational Psychology in Teachers College, Columbia University.

Cloth, 12mo, ix + 292 pages, $1.25 net

"In Professor Edward L. Thorndike's treatise on "Education" there is a great deal of wise philosophy and practical good sense. The author expresses the hope that it may prepare students in colleges and normal schools to see the significance of their more specialized studies in educational psychology and sociology, methods of teaching and class management, the history of educational theory and practice and the applications of philosophy and ethics to education. For these purposes the book is admirably adapted, but it should have a use beyond all this in suggesting to teachers, and especially elementary teachers who are actually in service, new methods of instruction and new arrangements of courses more in accord with modern ideas than those that were in vogue when they received their training."

—*The Living Age.*

"Modestly offered as a first effort, is a whole course in teaching."

—*Review of Reviews.*

"Contains a mine of helpful suggestion to any intelligent reader."

—*The Nation.*

THE MACMILLAN COMPANY
Publishers 64–66 Fifth Avenue New York

Animal Intelligence

EXPERIMENTAL STUDIES

By PROFESSOR EDWARD L. THORNDIKE,
Teachers College, Columbia University.

Cloth, 12mo, 297 pages, $1.60 net

In this volume are brought together the principal experimental studies of animal intelligence made by Professor Thorndike, and a discussion of the general laws of animal intellect and behavior, which have been demonstrated by recent work in animal psychology. These studies have a twofold interest. In the first place since they represent the first deliberate and extended application of the experimental method in animal psychology, they are a most useful introduction to the later literature of that subject. They mark the change from books of general argumentation on the basis of common experience interpreted in terms of the faculty psychology, to monographs reporting detailed and often highly technical experiments interpreted in terms of original and acquired connections between situation and response.

The work includes chapters on The Study of Consciousness and the Study of Behavior; Animal Intelligence; The Instinctive Reactions of Young Chicks; The Psychology of Fishes; The Mental Life of the Monkeys; Laws and Hypotheses of Behavior, and The Evolution of the Human Intellect.

THE MACMILLAN COMPANY
Publishers 64-66 Fifth Avenue New York

A Brief Course in the Teaching Process

By GEORGE DRAYTON STRAYER, Professor of Educational Administration, Teachers College, Columbia University. *Cloth, 12mo, xiv + 315 pages, $1.25 net*

This new book by Professor Strayer meets the great and very real need for a teacher's professional book of "Theory and Practice," which though full of meat, can be read in those "marginal minutes" which are all that a very large number of teachers have for reading.

Professor Strayer has had in mind not so much the specialist as (1) the young teacher, who needs to get much help in a short time; (2) the teacher with limited training to whom every school-room problem is mountainous; and (3) the overworked teacher who desires to keep abreast of the world in her profession, but has not time to wade through morasses of display stock of pedagogical "wisdom."

For example: The chapter on "Study" offers more in a few pages than some entire books of hundreds of pages devoted to the topic.

The ever troublesome questions of inductive and deductive teaching are made as clear as crystal in two brief chapters. Teachers who have studied whole books on these topics only to be befogged will be surprised at their simplicity as given here.

"The book exhibits a sane interest in concrete, effective teaching, and no teacher can go through it and get its point of view, and especially work out the problems, without being helped immensely thereby."—*The Dial.*

"One of the latest and best books of its kind. Teachers should put it into their libraries not for ornament but for use. The book is a growth, not a creation; a product of the laboratory and classroom, not of midnight oil only. Each of its nineteen chapters deals with a topic of practical value and provokes thought."

—*American Education.*

THE MACMILLAN COMPANY

Publishers 64-66 Fifth Avenue New York

The Administration of Public Education in the United States

By SAMUEL TRAIN DUTTON, LL.D., Professor of School Administration in Teachers College, Columbia University, and Superintendent of the College Schools. Author of "Social Phases of Education," "School Management," etc., and DAVID SNEDDEN, Ph.D., Commissioner of Education, State of Massachusetts. Author of "School Reports and School Efficiency," etc.

New Edition, cloth, 8mo, $2.00 net

"The careful and scholarly study of the administration of education in the United States by my colleagues, Professors Dutton and Snedden, is a valuable and timely contribution to the literature of education. In a democratic State, it is of first importance that the relation of the State to the organs and agencies of culture and enlightenment be clearly defined and well understood. The wise and truly representative organization and administration of education is only a little less important than the organization and conduct of the educational process itself.

" By far the largest part, and an increasingly large part, of the educational activity of the United States is governmental. It is this governmental educational activity with which the present volume deals. It brings together, in considerable part for the first time, a large mass of carefully ordered material bearing upon the evolution and present condition of educational administration, and it presents, in a form valuable either for study or for reference, the present state of educational administration in the United States, so far as that administration is governmental in form."—NICHOLAS MURRAY BUTLER.

THE MACMILLAN COMPANY

Publishers 64–66 Fifth Avenue New York

A History of Education Before the Middle Ages

By FRANK PIERREPONT GRAVES, Ph.D., Professor of the History of Education in the Ohio State University.

Cloth, 12mo, $1.10 net

This book gives a comprehensive account of the history of education before the day of the monastic schools. It presents sufficient material to mark the most significant movements and discloses the underlying principles without entering into unnecessary detail. All interpretations are based upon historical data collected from the sources, and direct quotation is liberally used throughout.

"Professor Graves has taken the method of procedure, at once most natural and most philosophical, of studying each stage with a view to progress."—*The Outlook.*

"A book which gives evidence on every page of ripe scholarship, breadth of view, and keen discrimination between significant things and mere detail."
—*The School Review.*

"Professor Graves does well to give the profession the fruit of his abundant knowledge in a scholarly text-book and reference work, complete without being tedious, condensed without being lifeless."—*Journal of Education.*

THE MACMILLAN COMPANY
Publishers 64–66 Fifth Avenue New York

History of Education During the Middle Ages and the Transition to Modern Times

By FRANK PIERREPONT GRAVES, Ph.D., Professor of the History of Education in the Ohio State University.

Cloth, 12mo, $1.10 net

This volume is a continuation of the "History of Education before the Middle Ages." Without dwelling upon matters remotely related to the educational problems of to-day, an accurate picture is afforded of educational history between the sixth and the eighteenth centuries. The sources are extensively quoted, and selected lists of supplementary reading are given at the end of each chapter. The book is suitable as a text or a work or reference.

"In the same spirit of careful research and open-minded discussion that marked the first part of his work."—*The Independent.*

"The present volume is not only as good as, but better than, the previous one. The work is conspicuous among histories of education as one of the most complete and interesting."—*Journal of Educational Psychology.*

"He has made of dry historical facts a narrative full of interest, one that touches the life, politics, religion, and philosophy of the times."—*Pedagogical Seminary.*

A History of Education During Modern Times

By FRANK PIERREPONT GRAVES, Ph.D., Professor of the History of Education in the Ohio State University.

In preparation

In continuation of the two preceding volumes, this work will cover the history of education from the days of Rousseau and the French Revolution to the present time.

THE MACMILLAN COMPANY
Publishers 64-66 Fifth Avenue New York

Great Educators of Three Centuries

By FRANK PIERREPONT GRAVES, Ph.D., Professor of the History of Education in the Ohio State University.

Cloth, 12mo, $1.10 net

This book furnishes a popular account of the life and work of the men who, during the past three centuries, have introduced various innovations and reforms into modern education. While the facts of biography are narrated somewhat at length, an effort has been made to eliminate everything that does not have some bearing upon the contributions of the educator under consideration.

"As history is largely a matter of biography, and as institutions are usually the lengthened shadow of a man, so the historic trend of education can be indicated well enough for the casual reader by an intelligent summary of the work of a few great educators together with comments on the tendencies and interrelations of that work. Professor Graves has gotten up such a summary in his brief volume, in which he has judiciously selected and clearly stated his facts. His comments on these facts are illuminative and his comments would seem to be well founded."—*Boston Evening Transcript.*

"The thoroughly painstaking method of Professor Graves is evident on every page of these splendidly written books. A scientific and scholarly attitude combined with common-sense makes these by all odds the most practical text-books yet published in this field."—PROF. W. G. CLIPPINGER, of Ottenbein University.

"The social settings, dialectic methods, and ultimate achievements of nearly a score of illustrious world reformers are here brilliantly outlined."

—The Philadelphia North American.

THE MACMILLAN COMPANY

Publishers 64–66 Fifth Avenue New York

A Cyclopedia of Education

Edited by PAUL MONROE, Ph.D., Professor of the History of Education, Teachers College, Columbia University; Author of "A Text-Book in the History of Education," "Brief Course in the History of Education," etc.

TO BE COMPLETED IN FIVE LARGE OCTAVO VOLUMES.
SOLD ONLY BY SUBSCRIPTION, EACH VOLUME, $5.00 NET.

WHAT NOTED EDUCATORS SAY OF THE CYCLOPEDIA OF EDUCATION

ELMER E. BROWN, U. S. Commissioner of Education:

"The appearance of the first volume undoubtedly marks an epoch in the development of our educational literature. Its great value and usefulness are immediately apparent. I can see at once that it will save me a vast amount of labor by its concise and competent treatment of a large number of topics with which I have to do almost daily in one way and another. A number of the articles to which I have already referred are admirable in their clearness, comprehensiveness, and balance. The tables, diagrams, illustrations, and particularly the well-selected bibliographical references, will be found extremely useful.

"Both the editor and the publishers are to be congratulated on the appearance of a publication so attractive, so valuable, and so well suited to supply an urgent need."

ELLWOOD P. CUBBERLEY, Professor of Education, Leland Stanford University:

"I have just finished a careful examination of Volume I of your new *Cyclopedia of Education*. I have been much interested in its production, and expected much, but it exceeds my expectation. You have done a fine piece of work in organizing our present knowledge in the field and the work will be of the greatest service to all. Sets of it ought to be in every school library, city and country, and in every public library, even though small. Accept my congratulations on the issue of the first volume."

J. H. COLLINS, Superintendent City Schools, Springfield, Illinois:

"I have received the first volume of the *Cyclopedia of Education* edited by Paul Monroe, and am highly pleased with it. To one who is interested in problems of education it is a work of great value and interest. I have already studied many of the leading articles of Volume I, and await with interest the arrival of Volume II."

SEND FOR LARGE PROSPECTUS AND SPECIAL LIBERAL OFFER TO TEACHERS

THE MACMILLAN COMPANY
Publishers 64–66 Fifth Avenue New York

ONTARIO COLLEGE OF EDUCATION
DEPT. OF EDUCATIONAL RESEARCH
UNIVERSITY OF TORONTO

371.2007 S913E c.1
Strayer # Educational administration : quantita
OISE
3 0005 02013494 9

DEPT. OF EDUCATIONAL RESEARCH
UNIVERSITY OF TORONTO

371.2007
S913E
Strayer
Educational administration

371.2007
S913E
Strayer
Educational administration